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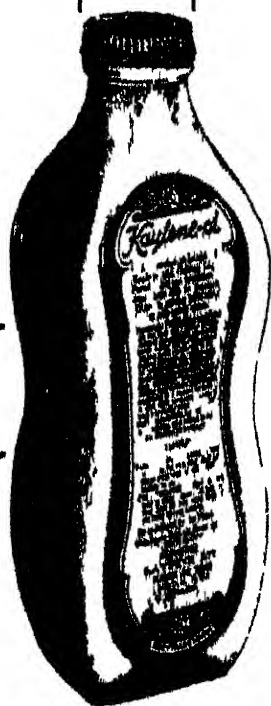
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## Infectious Diseases in Public Schools, Their Origin, Spread and Prevention

By L. R. LEMPRIERE, O.B.E., M.D.

*Resident Medical Officer to Hertsbyury College, formerly President  
of the Medical Officers of Schools Association*

**D**URING the middle of the nineteenth century a number of large public schools were founded, and the numerous problems concerned with the health of this largely increased number of pupils, which soon aroused more than individual and local interest, led, in 1881, to the formation of the Association of Medical Officers of Schools. One of the most urgent matters claiming their attention was the need for the general adoption of more definite rules for guarding the great educational establishments from the outbreak and spread of "preventable" infectious diseases. Wide differences of procedure were found in different institutions when dealing with similar conditions of disease, and in order to secure a much-needed uniformity, "A Code of Rules for the Prevention of Infectious Diseases in Schools" was published in 1885—the result of the experience and opinion of many special authorities. Amongst the pioneers in this work may, perhaps, be mentioned the late Dr. Alder Smith, of Christ's Hospital, and the late Dr. Clement Dukes, of Rugby. This "Code," to which

frequent reference will be made, still remains the school doctor's guide and authority. In the light of further experience the rules and advice laid down have been modified from time to time, but they remained substantially the same till 1928, when much of the "Code" was rewritten, and important alterations made.

Now it must be admitted at the outset that the objective of the founders of the association has not been reached. It must also be admitted that, in the light of present knowledge, the adjective "preventable" is incorrect as regards the majority of these diseases. So far, indeed, from "prevention" being attained, there has been practically no diminution in the incidence of these infections, or in the total numbers affected. In other words, though the rules laid down have been faithfully followed for over forty-five years, in practically all public schools (boarding and hostels), and the system advocated has had a prolonged trial under various conditions, the result has been failure from this point of view.

The following figures, taken from six big public schools in different parts of the country, illustrate the truth of the above statement. Unfortunately, it has not been possible to get parallel figures for previous decades in more than two instances, in which apparently contradictory results are shown. Consequently, no conclusion can be drawn as to the increase or the reverse of the number of epidemics or the ease incidence at the present time compared with the past, but that the numbers remain high is beyond doubt. A period of ten years has been chosen, as the records for a shorter period are so readily vitiated by an exceptional single year, either of no outbreak or of widespread epidemics. This is particularly true of mumps and rubella. It may be noted that in the school II shown below, during the first decade, 1880-1889, fourteen terms were free from any infection; in the decade

1921-30 only three terms were unaffected.

<i>Type of School</i>	<i>No. of Boys.</i>	<i>Years.</i>	<i>Epidemic Cases.</i>	<i>Average.</i>
(1) Hostel "H" - - -	500	1880-89	21	544
		1894-1903	34	829
		1904-13	35	747
		1911-23	15	716
	(i.e., 600)	1921-30	35	747
(2) Hostel "Ch." - - -	800	1902-11	75	1,569
(30 per cent. under 14).		1912-21	63	1,142
		1922-31	51	1,116
(3) Hostel "W" - - -	650	1921-30	42	989
(4) Boarding House "Re."	400	1921-30	26	331
(5) Boarding House "Bg."	490	1893-1902	50	656
		1903-12	50	907
(6) Hostel "M" - - -	760	1921-30	36	756

An analysis of these epidemics shows the following: ---

	<i>Epidemics.</i>	<i>Cases.</i>	<i>Average.</i>
Measles - - - - -	62	2,923	17
Rubella - - - - -	123	3,531	28.7
Varicella - - - - -	139	1,539	11
Mumps - - - - -	118	2,657	22.5
Scarlet fever - - - - -	71	268	3.7
Pertussis - - - - -	50	228	1.5

#### ORIGIN OF EPIDEMICS

This may be divided roughly into two groups: -

(a) *Holiday infection*, i.e. arising within the first three weeks of term, or in the case of mumps, the first four weeks. It is, of course, well known that epidemics at the beginning of the September term are rare, partly due to the healthy, open-air life the average boy has led in the summer holiday in a family unit, partly to the seasonal prevalence of the exanthemata. Before the other two terms, the theatre, cinema, dances, ice rinks, winter sports (a recent additional and very real source of infection), are the chief causes.

(b) *School infection*. Of late years the enormously increased transport facilities with the constant visits of relatives and friends to schools, and the increased latitude in allowing boys to go away from school for various reasons, make any pretence at segregation of the school community impossible. The very large

increase of inter-school games, not merely of first and second teams, but also of "colts" (boys under 16), and of field days, is a theoretical source of danger, but owing to the strict—many think too strict—restriction on the part of the school authorities in cancelling fixtures on the slightest risk, this is, I believe, very rare. This policy of playing for absolute safety undoubtedly causes irritation and disappointment and has, I think, been overdone. Other possible sources are the candidates for junior scholarships from private schools, masters' families, servants, tradespeople, etc. More than twenty years ago a widespread epidemic of measles was introduced into a number of public schools at an army examination held in London in the middle of an Easter term, through one of the candidates from an infected school.

It is quite clear from the above that there is no attempt to maintain the ringed fence, and the possibilities of infection are numerous. This division is purely arbitrary, and some of the "school" outbreaks may really be due to holiday infection. This is particularly true of rubella and mumps, in which the first cases may easily be missed; it is less common in varicella and scarlet fever, and never occurs in measles. In many cases, however, the origin of an epidemic arising during term time is quite unknown; the frequency with which varicella, for example, arises in the middle of the September term is astonishing.

#### SPREAD OF INFECTION

When the "Code" was first issued, the compilers and their contemporaries laid great stress on dirt, defective drainage, and fomites as conveyors of infection, and rigid disinfection was insisted on both for the individual and all his belongings, not only for patients at the end of convalescence, but also for all contacts and those exposed to infection before their return to school, whether they had previously had the disease

or not. Further experience has shown this to be unnecessary in the majority of cases. For many years I have discarded disinfection of the individual and his clothing after exposure to, or infection by, measles, rubella, mumps, and pertussis, without giving rise to fresh cases, whilst the same books have been used in various epidemics on different occasions, without in any case giving rise to cross-infection. Previously the books were burnt. Disinfection, however, is necessary in scarlet fever, diphtheria, and varicella. From a practical point of view, the spread of infection in schools is purely a personal matter, direct from boy to boy. Dudley has done much to crystallize the views held by many of us for a long time, by his theory of the "velocity of infection." Space, however, forbids any elaboration of this point on which we are all agreed, i.e. that the boy-to-boy infection is of primary importance.

"Where" and "how" this infection commonly spreads differs in different school communities. Wherever there is overcrowding for any period of time, infection is likely to spread. In hostel schools, for example, where life is so intimate throughout, I believe that spread takes place most frequently in the house- and class-rooms, then in the dormitories and chapel. In all these cases it may be possible to trace the second and third batches of infection, but rarely beyond, as there is such free and indiscriminate intercourse in games and places such as big school and the "grub" shop. In the boarding-house type of school, infections are much more likely to be confined to a single house, though here again the studies and dining-room, so often a common meeting ground apart from meals, play just as important a part as the sleeping quarters in this spread. I cannot help feeling that Dudley has laid undue emphasis on the importance of the dormitory as the main spread of infection in public schools. This may be true in large open dormitories

with crowded beds, but sleeping arrangements differ so much (single rooms, cubicles, high compartments), that I can only agree that his conclusions are true in some cases but not in all.

#### THE EXTENT AND DURATION OF AN EPIDEMIC

Broadly speaking, the extent depends on the nature of the infective agent, whether there are one or more foci, and the "herd immunity." But there are so many exceptions recorded that it is impossible to forecast the numbers in any given epidemic, except possibly of measles, which is the only infection that is at all constant. Here it may be expected that four-fifths of the susceptibles will be attacked. There are many exceptions even to this disease; e.g. at "H" school two cases of measles in Jan., 1903 are followed by 105 cases in Feb., 1903; one case in Jan., 1923 is followed by forty-four cases in Feb., 1923; whereas in Feb., 1930 an epidemic of only fourteen cases occurs (affecting seven houses and therefore widespread) out of a population of 112 susceptibles.

The *duration* is equally variable. In the case of measles, however, it is safe to assume that the larger the epidemic (i.e. the number of susceptibles), the quicker it will be over, owing to the greater concentration of explosive material. This means a heavier demand on bed accommodation, and Dr. H. G. Armstrong's (late of Wellington) forecast of twenty years ago that in a school of 500 an epidemic with an expectation of 50 cases requires twenty beds, of 100 cases seventy beds, and of 120 cases ninety beds has proved most valuable in making due preparation.

#### IMMUNITY

It is generally accepted that one attack of the exanthemata as a rule confers lasting immunity; second or even third attacks may occur, but they may be regarded as medical curiosities. Some reported

second attacks are undoubtedly due to errors in diagnosis; this is particularly true of measles and rubella, which are often confused. Amongst over 3,000 boys, aged 13½ on entry at school "H," 1·15 per cent. were reported to have had measles twice, ·65 per cent. to have had rubella twice, and in all cases which could be carefully investigated it seemed clear that there was a mistaken diagnosis in one of the two reported attacks. School doctors, however, are not the best judges on this question, owing to their comparatively short period of contact with individual boys, and too much reliance should not be placed on their negative evidence. The well-known fact that a considerable number of boys pass through their school career unaffected by recurrent epidemics may be reasonably explained by their exposure to repeated subminimal doses of infection, and this would help to explain the frequent wide differences between the attack rate and the susceptible population in a given infection. The immunes on entry at school for any long period of years are difficult to get, but the following comparative record at school "H" for groups of years does not, to my surprise, support the contention so often advanced that the boys in public schools of to-day are less protected than their forefathers. It seems to be true of scarlet fever, and possibly of measles; but such a record obviously needs confirmation.

#### IMMUNE ON ENTRY : SCHOOL "H"

No. of Boys	1883-87. 1,610	1903-12. 1,100	1926-31. 860
Immune to Measles	77 per cent.	70 per cent.	74 per cent.
„ „ Rubella	—	18	23
„ „ Varicella	—	65	73
„ „ Mumps	—	21	38
„ „ Scarlet fever	18 per cent.	11	8
„ „ Pertussis	73	68	75

#### SPORADIC CASES

One of the most interesting points in school infections



is the number of single cases. The following figures are extracted from the records previously given and show an average of 28 to 34 per cent. of sporadic cases to total epidemics :—

<i>School.</i>	<i>H.</i>	<i>Ch.</i>	<i>W.</i>	<i>Re.</i>	<i>M.</i>	<i>Rg.</i>
	<i>27 yrs.</i>	<i>30 yrs.</i>	<i>10 yrs.</i>	<i>10 yrs.</i>	<i>10 yrs.</i>	<i>20 yrs.</i>
Epidemics -	141	189	42	26	36	100
Single Cases -	46	54	12	9	10	33
Measles -	2	2	1	1	2	4
Rubella -	8	17	—	3	—	3
Varicella -	14	9	3	1	4	6
Mumps -	13	12	4	3	—	2
Scarlet fever -	9	7	3	1	3	10
Pertussis -	—	7	1	—	1	8

Of these, mumps and rubella, in both of which the immune rate is low, have given rise to the largest epidemics, of over 200. I suggest that the numerous single cases of these two infections are of a non-specific nature, though clinically they may exactly resemble cases seen in a full-blown epidemic. This non-specificity is recognized in mumps, but not generally so in rubella, one of the most difficult to diagnose of the exanthemata, and which may cover a variety of rashes, such as Duke's fourth disease, epidemic roseola, and para-scarlet (the latter sponsored by Dr. Friend of Christ's Hospital). I believe in the polymorphism of rubella, and have not satisfied myself of the separate entities mentioned. The incidence of varicella, in which the immune rate is high, is almost equally large and inexplicable. It constantly appears in the middle of term (39 times out of 54 epidemics), and rarely spreads.

#### PREVENTIVE MEASURES

These can only be considered briefly :—

(1) The rigid observation of quarantine and segregation of contacts. The loss of time, and therefore of work and fees, entailed by this observance is colossal.

(2) The insistence on a clean health certificate, when a boy returns to school, to be of any value, must

be absolutely rigid. Alternatively notification may be demanded from the parents of any illness or contact with illness of their boy during the holidays.

(3) Disinfection of the individual affected and his contacts by disinfectant baths, and of the clothing, rooms, and effects by steam and chemicals. The attitude of the Medical Officers of Schools' Association on this point is shown in the last edition of the "Code," in which the great importance of soap and hot water, fresh air and sunlight is emphasized, and much less faith is placed in chemicals.

(4) Spraying of class-rooms and dormitories has been tried by several public school doctors, without much, if any, success. Others claim that they have stopped epidemics by this measure, but the evidence is not convincing, and my own experience is most disappointing.

(5) Attempts to disinfect the nasopharynx of the community in bulk have been made from time to time in various schools, and occasionally apparent success has been obtained. But in a large public school I do not think it is really practicable, and, moreover, believe it to be a potential danger, not only on the physical side, but also mentally, as tending to induce a premature valitudinarianism.

(6) Closure of schools. —Here again I quote from the "Code": "This should never be done, except as a last resort, and then only after consultation with and approval of the medical officer of health and the Ministry of Health. The opportunity for withdrawal may be given, but the onus of removing boys should rest with the parent."

(7) To these various measures must be added the notable advances made in the prevention of scarlet fever and diphtheria by the Dick and Schick tests. These complaints, however, are relatively so uncommon, and so seldom epidemic in public schools, that the necessity for wholesale testing must be very rare. Though not

strictly apposite here, the use of convalescent measles serum must be mentioned. It should be given in the incubation period, and not as a prophylactic. Its value is beyond question, and no greater therapeutic boon could be conferred on schools in measles epidemics. The difficulty of procuring it has not yet been solved.

This is a brief résumé of the main preventative measures for preventing the introduction and spread of infectious disease in public schools, which have had a thorough and prolonged trial, and the result is admittedly failure from a narrow standpoint. But, broadly speaking, the community at large definitely benefits, since the production of illness increases "herd immunity." Moreover, the individuals are affected at a time when their future careers are least jeopardized.

As an illustration of success in this way may be quoted, by permission of the War Office, some recent figures for Sandhurst. During the last seven years, with an average population of 500 cadets, there have been only 97 cases of infection (measles 45, mumps 38, rubella 14). It is hopeless to expect the private schools to encourage these juvenile ailments, though theoretically they are the ideal places, and so the public schools must continue to bear this burden which, indeed, they cannot avoid. Moreover, if it were possible, it is more than doubtful if the attempts to reduce the "droplet" infections are really sound policy; I believe they are not, and that this is not simply an individual expression of opinion is shown by the following appendix report in the last issue of the "Code," as an alternative suggestion:—

"Statistics for the last thirty years taken from some of these schools seem to show that the result has been at best a small diminution in the number of epidemics only, and no diminution in the number of cases. In other words the attempt to exclude infection, by its occasional success has only resulted in more widespread outbreaks later on, with the occurrence in some schools of more serious cases, especially in the case of measles. This failure in public schools is due partly to the comparative success that has

attended the efforts to keep infection out of preparatory schools.

The suggestion has therefore been made by some Public School Medical Officers that, as an alternative measure, observation of contacts *in* schools should take the place of the exclusion of contacts *from* schools in the case of the non-notifiable infections, and that the non-immune pupil, if a contact during the holidays, should be allowed to return to school at the beginning of term, and that after an attack the criterion of his return to school work should be the state of his own health. By this plan they anticipate that whilst the actual number of epidemics may at first be somewhat increased, the severity will be lessened and the total number of cases decreased by increasing the 'herd immunity,' thus effecting a saving in school time, cost and anxiety. In all cases where this policy is adopted it is essential that all parents be informed of the change of procedure and the reason for its adoption."

Quite apart from saving an enormous amount of time and money, and interference with school routine, such a policy would undoubtedly be ultimately of the greatest value, in measles particularly. It is this complaint which is so serious, with many dangerous complications and a death-rate that is not negligible; and a yearly outbreak of this disease would rob it of its undeniable dangers, which are entirely due to numbers and the inevitable overcrowding, and confer a boon to the boy, the parent, and the school. Legal advice has been taken on the question of the liability of a school should action be taken by a parent to recover expenses or damages for illness arising from the return to school of a non-immune contact, where the above policy might be in force. The opinion was expressed that such a policy was not without risk, and it is doubtful if the public are ready to accept it, though it is so much to their advantage. Until such a policy is accepted, or until the cause of these infections is discovered I see no escape from the present situation. It is, indeed, an impasse.

Twenty years ago Dr. Armstrong, then of Wellington College, summed up the position admirably:—"The 'Code' has signally failed in accomplishing its object—prevention. (1) It has imposed great penalties and difficulties on the public, so as to make even the most minor infections to be dreaded. (2) It has educated

the public in methods of protection, and as the smaller the unit, the easier this can be done, the family protects itself at the expense of the private school, and the private at that of the public school. (3) The condition which parents (through us) have brought about, is the one they grumble at: i.e. the recurring presence of these infections in public schools."

It is, however, possible that the special committee appointed by the Medical Research Council in 1929 to investigate these problems, amongst others, in public schools, may succeed where the individual school doctor has failed, if inability to prevent infection is, indeed, a failure. From the community's point of view, the schools' failure is the measure of their success.

For various reasons influenza, the real scourge of schools, in post-war years especially, epidemic tonsillitis and its connection with sporadic scarlet fever, diphtheria, and the comparatively recent nervous group, poliomyelitis, encephalitis, and cerebro-spinal meningitis, more serious but less infectious, have been deliberately excluded.

### Reference

"A Code of Rules for the Prevention of Communicable Diseases in Schools," issued by the Medical Officers of Schools Association, 9th Edition. London: J. and A. Churchill, 1928.

# Febrile Attacks

By WILFRID ATTLEE, M.A., M.D., M.R.C.P.

*Member of Eton College Medical Board; Physician to King Edward VII Hospital, Windsor.*

**F**EBRILE attacks account for a large part of a school doctor's work, and a boy or a girl "with a temperature" is one of the commonest cases he is asked to see. The heat-regulating mechanism seems to be easily disturbed during adolescence, and some individuals at that age become feverish on very slight provocation. Broadly speaking, it can be said that fever in adolescence takes the place of vomiting and convulsions in infancy. In school practice, febrile attacks can be divided into two groups according as they occur singly or in batches. Those occurring singly are always with us, and hardly a day passes in a big school without one or two inmates being affected in this way. Those occurring in batches do so at irregular intervals and are clearly infectious.

We are in the habit of calling them all influenza. It is a name which does very well as no better one is available, and it satisfies the lay mind, though it is more convincing in the winter than in the summer. Nevertheless, it is a loose term, and however justifiable it may be to apply it to the infectious group, it seems doubtful if it should be applied to isolated cases. Even the infectious groups vary within such wide limits that it is difficult to believe they can all be one disease, or that it is right to call them all by one name.

Crookshank realizes this in his "Influenza: Essays by several authors:"—

"To speak of the recurrent epidemics we call influenza as repeated invasions of the same disease, can only be true in the limited sense that the war lately concluded was the same as that of 1870. Certain like, or even identical causes were partly responsible for the disturbances produced in particular localities, but that is all. . . . Just as war, revolution and riot do not exist in Nature as things, so there is nothing with external existence or objectivity which makes its appearance from time to time, and to which we can apply

the term influenza."

The ordinary isolated febrile attack met with any day in a large school has only one thing in common with the attacks seen during an epidemic, and that is the absence of physical signs which are adequate to account for the condition. This ordinary isolated attack is usually mild and often ephemeral. It is common for a boy to develop a temperature of 103° or 104° F. suddenly in the evening, and to be normal or subnormal next morning, and to remain so. One of the early lessons learned by the school doctor is that the height of the thermometer is no measure of the gravity of the patient's condition. These patients complain of very little. They convalesce rapidly, and the whole illness is over too soon for elaborate investigation to be possible. Some such cases may be caused by constipation or over-eating, but not so many probably as the average school matron is inclined to think. Some of them, probably, are due to infections of hidden regions in the nose and throat; but, whatever their cause may be, they are different from those met in epidemics and do not tend to spread.

Epidemic febrile attacks, on the contrary, are highly infectious. They are all alike in that they have a short incubation period, begin suddenly with a rapidly rising temperature, and are accompanied by headache, pain on movement of the extrinsic muscles of the eyes, and aches and pains all over the body. Each epidemic, however, has individual characteristics of its own in the duration of the pyrexial period, the tendency to relapse, the amount and distribution of respiratory catarrh and the complications that ensue. Many theories have been advanced to account for these epidemics, and many organisms have been isolated, but we really know little about their origin or the cause of the differences between them. The whole question is a difficult one, and it is to be hoped that the committee which is now considering it, under the auspices of

the Ministry of Health, may be able to throw more light on the subject.

In the present state of knowledge school doctors can do little to prevent these epidemics. Preventive vaccines have been extensively tried, but the evidence of their value is conflicting and not very convincing. They can only attempt to control them by early identification and isolation, and to guard against complications by efficient nursing and treatment.

#### DIAGNOSIS

For all practical purposes this resolves itself into an attempt to make sure that the patient is not beginning some other and more definite disease, or if he is, to recognize the nature of that disease at the earliest possible moment. This can only be done by a process of elimination, and it may be a lengthy and laborious business. Too much weight must not be attached to the history given by the patient. The modern school-boy, for all his apparent maturity, is often a bad witness, and he is liable to miss the most important points, even though leading questions are put to him.

Physical examination is the great stand-by, and unless a strict routine is followed, something of consequence is likely to be missed, especially during an epidemic. It is so easy, when boy after boy is being seen, with fever, all of them looking very much alike, to forget to look at an ear, or to miss a Koplik spot, and it is disconcerting to see an otorrhœa or a rash at the next visit. Everyone has his own routine, but the following has been proved to be quick and reasonably complete. After inspecting the tongue and the sputum if there is any, the temperature and pulse are taken, and if there is any suggestion of dyspnoea, the respiration. The mouth, throat, ears and eyes are inspected. The cervical glands are palpated, the front of the chest is examined, and the axillæ are palpated. Hands and elbows are inspected, the patient sits up and flexes



his neck fully. The back of the chest is examined, and the lumbar regions palpated. The patient lies down and the abdomen is examined and the groins palpated. The legs and feet are inspected, not forgetting to look for knee abrasions. Knee-jerks and plantar reflexes are tested if there seems any reason to do so.

A good view of the mouth, throat and ears is absolutely essential, for in that region will be found the clue to many school-illnesses. Koplik spots and perhaps a speckled, soft palate or secretions on the tonsils or their stumps, or red and swollen faucial pillars and pharynx may indicate an obvious cause for the fever. All these can be seen best by daylight if it is good, but, if it is bad, the light of an electric auriscope is invaluable, and it is essential for a good view of the ears. If there is evidence of otitis media it is as well to transilluminate the antra, a proceeding which is simple with modern appliances and which should never be omitted when there is redness of one nostril only. It is wise to remove the pyjama jacket completely, for quite large masses of axillary glands and septic abrasions of the elbow joints can easily be missed if this is not done. Encephalitis, meningitis, and poliomyelitis would sometimes be recognized earlier if neck flexion were practised as a routine, and the same may be said of palpation of the loins and the uncommon but occasional perinephric abscess. Abdominal lesions usually give some pointer in their symptoms, though catarrhal jaundice is likely to go unrecognized longer than it should if the febrile attack is short and the vomiting at its beginning not marked. The urine should always be examined during the course of the illness, even though there may be no cause to suspect it.

This method of examination does not take long when practised as a routine, and, in spite of negative findings, it gives a comfortable feeling that at any rate most of the body has been gone over. It will, however, cease to satisfy after three or four days unless the fever has

subsided or shows distinct signs of doing so. By that time the exanthemata should have declared themselves and some symptoms or definite signs should have appeared if there is any serious affection of the upper or lower respiratory passages, central nervous system, or bones.

Other possibilities must then be considered, bearing in mind particularly the fact that some of the conditions which we should look for in older patients are seldom seen in schoolboys.

*B. coli* infection of the urinary tract, though met with in girls, is decidedly uncommon in boys. Tuberculous infection and enteric fever are possible, also pyæmia. Acute rheumatism may show little in the way of physical signs, but it is uncommon in public schools. Glandular fever should be recognizable by the enlargement of the superficial lymph glands and by lymphocytosis.

A school doctor should always regard with suspicion a febrile attack which makes a patient look really ill, or which begins with a rigor or recurrent vomiting, or in which pain, localized to any one area, is a prominent symptom. He should also always bear in mind that because twenty boys have influenza there is no guarantee that the twenty-first is not beginning measles, poliomyelitis, or some other totally different disease.

#### TREATMENT

Bed should be insisted on in even the mildest febrile attack until the temperature has been normal for twenty-four hours, and for longer if the attack has been at all severe. During epidemics, and if relapses are common, or if the resulting debility is great, a longer period in bed is desirable. At the beginning of an epidemic, and until its vagaries are known, it is wise to err on the safe side.

Free ventilation is essential, and boys seem to do better in single rooms than in wards. Two instances

will illustrate this.

Two years ago, when influenza was prevalent everywhere, a large boys' school had a big epidemic. The patients were all nursed in separate rooms, and the epidemic was characterized by very little catarrh of the upper respiratory passages, and almost complete absence of bronchitis and pneumonia. A few miles away, in a school where boys were nursed in large dormitories, the type of disease was severe and there was much bronchitis and several cases of pneumonia. On another occasion, when influenza was prevalent everywhere, a large boys' school with separate rooms had a small epidemic only, of a very mild character. At the same time a severe form of the disease was raging in the immediate vicinity with a considerable mortality in small, ill-ventilated houses and cottages, from broncho-pneumonia of the heliotrope-tinted variety. It was difficult to believe, while attending both schoolboys and outside patients at the same time, that we were not in reality dealing with two totally different diseases, and it was the more remarkable because the school mixed freely with its neighbours both in and out of doors all the time.

Some of these cases do better when the time-honoured calomel or other initial purge is omitted and a saline or mild laxative is substituted. Plenty of fluid should be given, such as lemonade, orangeade, tea, jellies, and abundance of sugar. Milk, cereals and fruit are better omitted for the first twenty-four hours.

Though there is no specific drug for these cases there is a good deal to be said for "a bottle," and a simple alkaline diaphoretic mixture seems to make schoolboys feel more comfortable physically and mentally. Ten grains of aspirin given in the evening, sufficiently early for the clothes to be changed, followed later by five grains of Dover's powder, may be of the greatest comfort. Sponging is desirable if the temperature is high for long periods, but it is unnecessary in ephemeral cases. Repeated doses of febrifuges seem, on the whole, ineffective in shortening the attacks.

Debility during convalescence is, in some epidemics, a troublesome sequel to the illness. When this debility is marked a few days' sick leave is desirable, and in all cases it is necessary to be cautious in allowing a return to games. The most satisfactory plan is for a boy to begin with those requiring the least exertion and to get back gradually to his usual routine.

# Practical Aspects of Measles

By WILLIAM GUNN, M.A., M.B., CH.B., M.R.C.P., D.P.H.  
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AFTER a period of apathy and neglect, measles as a serious disease affecting a large and particularly vulnerable section of the community, has recently come into its own. For the past decade or so the medical profession has at intervals been enlightened on the reality of its menace, immediate and remote, and lately the lay press has taken the matter up with enthusiasm. Between the popular view that measles is a trivial but apparently necessary event incidental to childhood, unworthy of the attention of a trained nurse, far less of a doctor, and the recent statement in the press that it is a deadly disease which the profession is powerless to prevent or modify, there is room for a review of the subject from its practical aspects. It is the purpose of this communication to inquire into the circumstances which make measles formidable, and to assess the value of the various measures, preventive and curative, which have been tried, or are still on trial, in combating the disease and averting its consequences. The present time is an opportune one to define our aims and clarify our ideas on measles, for the practice of medicine in this country is now passing through a transitional and difficult period. On the one hand, scientific methods and biological preparations are replacing the empirical therapeutic measures of the past, and, on the other, the care and treatment of the masses are gradually passing from the private practitioner to the organized health services of public authorities. It is inevitable that a certain amount of overlapping of activities and

even friction should occur at first between practitioners and organized medicine and even between the various organizations. Dr. F. N. Kay Menzies, Medical Officer of Health, in his recent report to the London County Council on measles during 1929-30, has formulated certain practical measures to obviate this and to secure closer co-operation between the various metropolitan health organizations. It appears that the best method of ascertainment and "following-up" of measles cases in London is provided by the school medical service working in co-operation with the various municipal and voluntary organizations and with the hospital services of the London County Council. The recent unification and co-ordination of the public hospital services of London render this arrangement both practicable and economical, but it is hardly applicable to the widely varying conditions in many urban and rural areas.

It is unnecessary in this article to present any detailed statistics on the morbidity and mortality of measles during its biennial invasion of the susceptible section of the community. It is sufficient to state that it causes more deaths than all the other common infectious diseases put together, and the mortality figures merely give an inkling of the amount of invalidity and lowered level of health and efficiency which follows in its train under certain conditions. Age is the most important single factor determining both the incidence of the disease and the prognosis as to life or complete recovery. The biennial recurrence of measles is due chiefly, if not entirely, to the accumulation of a susceptible population in the intervals between successive epidemics. In London, epidemics commence in October or November, reach their height in March, and usually take six or seven months to run their course. As a rule, the earlier and later cases are mild in character, while the worst cases occur at or near the crest of the wave. Taking England and Wales as a

whole, there are two periods of maximum incidence, in December and May respectively, but in the large provincial centres the epidemic curve generally tends to conform to the London type. The most constant effect of administrative measures directed towards control of the disease is to prolong the duration of the epidemics, but the total number of cases affected is not appreciably diminished. Simple prolongation of an epidemic is an advantage in two directions; in a large proportion of cases the attack is postponed until spring or early summer when the prognosis is favourable, and the effect of spreading the epidemic over a lengthy period enables the medical services to cope with the flow of cases at its height and lessens the tendency to overcrowding in hospitals. In the absence of general compulsory notification for measles exact statistics on morbidity are not available, but it appears that the highest attack-rate occurs in the 3-4 age group, while the fatality is greatest in the first year of life. Fatality remains high until the third year, when it falls steeply, and in children of five years of age and over, measles appears to be a comparatively innocuous disease. The case-mortality again rises after the fifteenth year and is very high, although the disease is rare, in old people. It follows that all measures which tend to defer an attack to the later age-groups will effect a proportionate reduction in mortality and a corresponding reduction in the incidence and gravity of complications. It so happens that the attack-rate is high in the lower age-groups in the very section of the community least able to withstand it, where under-nourishment, debility, and unfavourable hygienic conditions are the rule. Under those conditions, opportunities for infection at an early age are frequent, owing to the constant and intimate contact of the population, in whom the onset of measles would probably be overlooked until the appearance of the rash. To obtain the best results, it is essential to ascertain the state of

the community as regards its susceptibility and exposure to infection, and follow a definite scheme whereby each individual attack is controlled or postponed until the conditions requisite for safe and successful immunization are present.

The new-born infant of a mother who has had measles previously is immune to attack, and this immunity, which is conveyed through the placental circulation, lasts for two months absolutely and for four or five months relatively. If the child is breast-fed, the duration of immunity, absolute and relative, is two months or so longer, but by the age of nine months children appear to be completely susceptible. The longer immunity enjoyed by the breast-fed babies is probably due in part to the fact that they are less exposed to infection, as to all risks, than are artificially fed children, but there is reason to suppose that small amounts of antibody pass in the maternal milk. If the expectant mother develops measles the foetus appears to escape attack, for its immunity lasts no longer than that of the average child. In the case of congenital measles, however, the immunity afforded is permanent. The rash appears on mother and child simultaneously, but on the latter it is limited to the upper part of the body, and the attack is always mild.

The paternal history as to measles appears to have no bearing on the presence of immunity in the child. It follows that, except in the rare instances in which the mother had escaped attack, no special measures are required for the infant under nine months. Somewhere between the ninth and the twelfth months all children become completely susceptible, and susceptibility lasts throughout life in the absence of attack. As far as can be ascertained, there is no positive evidence of a process of latent immunization or "salting" of the population, such as is known to occur in certain infectious diseases.

Once it is realized that practically everyone must

have the disease sooner or later, the problems of measles control are simplified. Instead of getting into a panic when an epidemic approaches we should proceed along certain well-defined lines, with the needs of the individual constantly in mind, and leave the epidemic to take care of itself. The disease is dangerous to children under three years of age, to the weakly and debilitated, to victims of avitaminosis of any grade, who live in crowded and insanitary houses; these should be protected. Without specific interference the average age of attack will rise with improvement in the standard of living and housing conditions, as has been observed during the past few decades, but such improvement is necessarily gradual, and immediate action is required. A special technique to achieve disinfection (the Milne method) has been devised whereby contacts are dosed with eucalyptus oil, and patients are swabbed with 10 per cent. carbolic oil, and placed in a gauze tent sprayed with eucalyptus, but the method has received scant approval from those actively engaged in fever work. Measles is most infectious in the catarrhal or pre-eruptive stage, and once the rash has disappeared infectivity is reduced almost to zero point, even in the presence of complications. Moreover, the viability of the virus is so low that the risk of spread by fomites or third persons is negligible; terminal disinfection, as commonly understood, is not necessary, but thorough washing with soap and water is advisable.

#### IMMUNIZATION

These considerations render the employment of some method of immunization the only practicable measure to guard susceptible children from danger to life and health. After the age of three years, absolute protection is unnecessary, is indeed unwise, should other circumstances be favourable, and one of the methods of modifying the severity of attack should be



substituted so that a permanent immunity is established. After five years, should the child still have escaped attack, the best course is to expose him deliberately to infection and ensure attenuation by the use of serum. In this way the whole population is attacked and rendered immune, under the most favourable conditions, by the time the child enters school or shortly thereafter. In the absence of a reliable test to denote immunity, some few cases would probably develop a second attack, especially those in whom the process of attenuation was carried too far, but these attacks would almost certainly be very mild and uncomplicated, as in the rare instances of second attacks under natural conditions.

If some scheme such as this were put in operation, the present complicated and costly machinery for dealing with epidemics of measles could be scrapped forthwith, school attendances would be well maintained instead of being seriously reduced during measles outbreaks by department closure or exclusion of contacts as practised at present, and, most important of all, the gain from the reduction of mortality and invalidity to a negligible figure would be incalculable. To take the place of the present system a new organization must be planned and put into operation, in which the general practitioner will regain his right of place as the chief agent in measles control. The scheme may appear grandiose and somewhat Utopian at first sight, but provisional arrangements have already been made to put it on trial on a small scale in one metropolitan borough during the coming epidemic. To ensure success the public must be educated by active measles propaganda by means of leaflets, posters and lectures, medical practitioners circularized offering them the necessary apparatus and instruction free of charge, and infant welfare centres furnished with the requisite personnel and equipment. Compulsory notification of first cases in the family is essential, but

it is unnecessary to notify subsequent cases. The failure of compulsory notification in the past is attributable in part to the indifference of parents who fail to call a doctor, but it is probable that the recent public awakening to the risks of measles will result in fewer cases being missed in the future. The majority of London medical officers of health are satisfied with its advantages and are confident of further improvement in this direction.

On the outbreak of measles in a family the practitioner or infant welfare medical officer requisitions a supply of convalescent serum from the borough public health department and administers it at once to the exposed susceptible members according to their individual needs. The earlier the injection is made after the exposure the smaller is the dose required, with consequent economy of the serum. Some borough authorities are already making arrangements for collecting serum from the convalescents, but a serious obstacle is the lack of suitable adult donors. At the Southern Group Laboratory, Infectious Diseases Services, London County Council, a stock of serum is kept ready for injection, but at present it is barely sufficient for hospital requirements. Dr. Nabarro, pathologist to the Children's Hospital, Great Ormond Street, has prepared a quantity of serum from which practitioners may obtain supplies on request. To cover the cost of production a nominal charge of 1s. per c.cm. is made to public institutions and 1s. 6d. to 2s. per c.cm. to private practitioners. The stock is somewhat low at present, but it is hoped to replenish supplies in the course of the present epidemic. It would serve no useful purpose to describe here the minute details of the preparation of serum as the services of a fully-equipped laboratory are essential, but the practitioner should be prepared to collect blood from donors. Care must be exercised in the selection of donors; they must be healthy and well able

to stand the loss of blood, free from tuberculous or syphilitic taint, and not exposed recently to any infectious disease. The blood is withdrawn ten to fourteen days after defervescence, and amounts up to 20 c.cm. may be taken from a child of five years, 100 c.cm. from a child of ten years, and 250 to 500 c.cm. from an adult. The blood is run with aseptic precautions into glass containers, treated previously with agar to favour clot-formation, or potassium oxalate to prevent clotting. At the laboratory the clear serum is drawn off, tested by the Wassermann reaction and for sterility, and three or more samples are pooled to ensure uniform potency. It is customary to filter the serum and add phenol or other preservative. The final product is distributed in sterile ampoules and stored at 4° C. until required for use.

To afford complete protection a minimum dose of 5 c.cm. is injected intra-muscularly in the first five days after exposure to infection, and, from the age of three years onwards, the dosage is reckoned in c.cm. by multiplying the age in years by two. To produce an attenuated attack the same dose is injected between the sixth and ninth day after exposure, or, preferably, half the above dose is given before the sixth day. Provided the potency of the serum is satisfactory the desired results are obtained in 100 per cent. of cases.

The method which I desire especially to bring to the notice of practitioners and medical officers of health combines the merits of simplicity and economy and is hardly less successful than the employment of convalescent serum. The only apparatus required is an all-glass or "Record" syringe of 40-50 c.cm. capacity with a sharp needle. These are lubricated with liquid paraffin, wrapped in "Kraft" brown paper and sterilized in the autoclave, or the outfit may be sterilized at the bedside with paraffin heated to 130° C. The former is preferable, and it is recommended that

public health bodies should hold a stock of suitable syringes ready sterilized for the use of practitioners. When measles breaks out in a family the doctor draws 40-50 c.cm. of blood from the arm-vein of either parent, who must have had measles previously, and immediately injects a suitable amount of the blood into the vastus externus of susceptible contacts. It is unnecessary to add sodium citrate as the presence of liquid paraffin prevents clotting and the likelihood of sepsis is remote, as manipulation is reduced to a minimum. It is wise to inquire into a history of syphilis, or, if thought advisable, the Wassermann reaction may be carried out previously. Convalescent donors, if available, may be used in like fashion to provide whole blood for contacts, but the Wassermann reaction must be done in every case if the donors are not members of the same family.

The employment of professional donors has been advocated, but a serious objection is the possibility of the potency of the blood being reduced by repeated bleeding, although successful attempts at re-activation by injection of infectious measles material have been reported recently.

The appropriate dose of adult whole blood, both for prevention and attenuation, is double that of convalescent whole blood and four times that of convalescent serum.

The attack following exposure where sero-attenuation is practised is always mild and uncomplicated; the temperature does not usually rise above 100° F., catarrhal symptoms are transient or absent, Koplik's spots are generally sparse, and the rash often resembles rubella rather than the typical rash of measles. The resultant immunity is usually complete and permanent.

#### TREATMENT

Convalescent serum and whole blood have been employed in the treatment of the acute stage of

measles, but the results obtained hitherto have not been encouraging. Probably a more generous dosage, given early, in the catarrhal stage preferably, would mitigate the severity of attack, but, at present, supplies are too scanty to institute serum treatment on an adequate scale. Even large doses of serum fail to produce any alleviation in the later stages when complications threaten: this failure is probably due to the presence of secondary invaders as the causal agents of complications. The suggestion to use anti-streptococcal or anti-pneumococcal sera for lung complications is rational, provided one could ascertain the nature of the infecting organism during life.

With this aim in view, in collaboration with Dr. V. D. Allison, assistant pathologist, Infectious Diseases Service, I have investigated the flora of the throat and nose and tried to correlate the findings with the results of examination of lung puncture during life and of lung tissues at necropsy. It was concluded that examination of the upper respiratory passages did not furnish a satisfactory guide to the causal organism in pneumonia, as usually the three commonest invaders were present together. The three invaders in order of frequency and of virulence were found to be *B. influenzae* (Pfeiffer), *Streptococcus hæmolyticus*, and the pneumococcus. Injections consisting of anti-streptococcal and anti-pneumococcal sera in equal proportions have been given, and appeared to exert a beneficial action on the course of the disease in a limited number of cases. Mixed vaccines containing the above-named organisms have been tried in treatment, but generally with disappointing results; they are sometimes of value in cases when resolution is delayed or recovery is incomplete.

Most writers on fevers deal with the section on the treatment of measles on the most general lines. Many of the remedial measures recommended are quoted from one textbook to another and have little reference

to modern tendencies in therapeutics. For the measles patient the sick room should be large, well ventilated, and kept at a constant temperature of 60° F. Direct sunshine should be excluded from the patient's eyes in the early stages, but the room should not be darkened. In hospital practice, bed isolation, preferably with glass partitions between each cot should be the rule, on account of the contagiousness of complications. For the same reason any tendency toward overcrowding must be avoided at all costs. There is no contra-indication to the tepid bath, either before or after the appearance of the rash, and tepid sponging is the best measure to allay restlessness and insomnia. In the acute stage, fluids only are tolerated, and no attempt should be made to force an unwilling child to take food. Sweetened lemonade, barley water, milk, suitably flavoured or specially prepared, and plain water only are required in the first few days. Diarrhoea is usually a transient symptom, but may require some simple drug like hyd.c.cret. or liquor calcis. The toilette of the mouth is important from the first. The whole buccal cavity is gently cleansed at frequent intervals with swabs moistened with warm soda bicarbonate solution. The application of glycerine preparations is best avoided, but a simple prescription containing potassium chlorate taken internally is almost specific in alleviating stomatitis and preventing ulceration and cancrum oris. Attention to the mouth and nasal passages is the key to the prevention of otitis media, suppurative adenitis and broncho-pneumonia. Laryngitis in the catarrhal stage usually requires no treatment and disappears with the appearance of the exanthem. Should laryngeal symptoms and signs appear after the rash has faded, diphtheria antitoxin should be injected at once, before waiting for the result of culture, and the steam tent employed. If cultures prove negative and the conditions get worse, an injection of anti-streptococcal serum is advised. Should

operative measures be indicated, intubation is the operation of choice for diphtheritic cases, and trachotomy for non-specific cases, on account of the liability to laryngeal ulceration.

When the symptoms and signs of pneumonia appear, antiphlogistine lightly applied to the bases, allowing free movement of the lungs, is excellent. If weather conditions permit, pneumonia cases do best in the open air, protected from exposure by a verandah or other suitable arrangement. It is important to maintain the body heat, and constant nursing attention is required. Empyema, usually syn-pneumonic, but occasionally meta-pneumonic in type, is a not infrequent occurrence in severe cases and seriously dulls the prognosis. Repeated aspiration by needling may be necessary, but far better results are obtained by a continuous suction apparatus with Wolff bottles. In pneumococcal cases the empyema cavity may be washed out at intervals with eusol or Dakin's solution, but, in streptococcal or Pfeiffer infections, aspiration alone is indicated. The treatment of suppurative adenitis and otitis media differs in no way from those conditions in non-specific infections.

No specific remedy for measles is mentioned as none are available. The latest so-called specifics, pyramidon and ultra-violet ray therapy, have not exerted any beneficial action on the disease, in the writer's experience, either in mitigating the attack or preventing complications. Convalescence is generally rapid, but all cases benefit by a generous dietary, suitable exercise in the open air, and a cod-liver oil and malt preparation, preferably irradiated. With these measures, the development of chronic bronchitis and recurrent pneumonia, or tuberculosis in its various forms, has become comparatively rare, but there is still need for increased facilities for the convalescence and after-care of measles cases, especially where the hygienic and housing conditions are unsatisfactory.

# Some Aspects of Mumps

## A Review of Recent Literature

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**B**ACTERIOLOGY.—According to Kermorgant mumps is due to a spirochæte present in the saliva at the onset of the disease, when it is relatively easy to obtain it by culture on anærobic media. In the course of its evolution the spirochæte assumes an extremely fine granular form which can pass through a Chamberland filter. Injection of the spirochæte into a monkey (*Macacus rhesus*) produces a disease resembling that caused by direct inoculation of the virus in the saliva and identical with the human disease. Inoculation of the filtrable form of the spirochæte into the testicle of a rabbit gives rise to an orchitis similar to that caused by the spirochæte. Kermorgant's investigations, although not generally accepted, have been so far confirmed in that Bénard found a spirochæte resembling that described by Kermorgant in the cerebrospinal fluid of two cases of mumps, and Zoeller observed numerous spirochætes in the centrifugalized clot obtained from lavage of the mouth in three cases of submaxillary mumps. Cultures were made on diluted serum under anærobic conditions, and after six weeks' incubation a spirochæte corresponding to Kermorgant's description was obtained. The results of treatment of mumps by arsenical preparations also favour Kermorgant's hypothesis (vide p. 38).

*Pathology.*—Interesting observations have been made by French, Italian and Russian observers on the salivary secretion in mumps. According to De la Prade and Loiret the cytology and physio-pathology of the parotid and submaxillary glands in mumps are



much the same as in the normal state, there being no essential difference in the character of the cells exfoliated, the fermentative activity of the saliva, or the quantity of the secretion. These observations indicate that the inflammatory reaction caused by mumps must take place exclusively in the peritubular tissue without affecting the glandular elements.

Rocchi, who made comparative observations on the saliva in 12 cases of mumps, as well as on that of healthy persons or those suffering from other diseases, found that the calcium and chloride content was increased until the fourteenth or fifteenth day, and then slowly diminished, returning to its normal level in from 27 to 30 days after the onset. On the other hand, the sulphocyanic acid and the amylolytic action of the saliva did not undergo any appreciable change. These results indicate the functional integrity of the secretory epithelium of the parotid when mechanical conditions allow it to resume its normal activity. Schastin, in the Children's Clinic at Leningrad, found a remarkable diminution of the salivary secretion in mumps, recovery of the activity of the parotid first affected being extremely slow. At a certain stage of the disease there was a diminution in the amylase content of the saliva, but this soon disappeared, while the variations in the content of the inorganic and organic substances in the saliva barely exceeded normal limits.

The lack of conformity in the leucocyte counts in mumps found by different observers has recently been emphasized by Jahn, who points out that while Pick, Citron and Marcowicki reported normal values, Barach found a low count throughout the disease, and Curschmann, Türk and Nägeli a high count, especially during orchitis. As regards the differential count, Curschmann and Feiling reported a lymphocytosis, whereas Marcowicki, Türk and Nägeli observed an increase of polymorphonuclears from the onset. Jahn, who examined seven uncomplicated cases of mumps in the

acute stage, found normal counts in two, and moderate leucocytosis in the rest. In four there was a lymphocytosis, and in two there was an eosinophilia of 1 and 10 per cent., respectively.

Capitan, who made observations on 700 cases of mumps in a military hospital, found that enlargement of the spleen was hardly ever absent in any of his cases. The organ, however, regained its normal size a few days after the end of the disease.

*Clinical aspects.*—The incubation period is liable to considerable variation, the extreme limits being 3 and 30 days. It is generally agreed, however, that it is longer than that of any of the other common acute infectious diseases, usually ranging between 18 and 22 days.

One attack of mumps usually confers immunity for the rest of life, and second attacks are so rare that physicians with considerable experience of infectious diseases, such as Baginsky, Heubner, and Comby, as well as the present writer, have never seen an example. A few instances, however, of repeated attacks have been recorded by Hochsinger, Kalischer and Schiller. Friedjung, a well-known pædiatrist of Vienna, recorded (1921) the unique case of a girl, aged 6 years, who, in the course of a year, had four attacks, the first of which occurred during an epidemic of mumps and the others in a non-epidemic period.

*Orchitis.*—In a paper based on 700 cases of mumps in soldiers, Capitan states that during the period 1914–1916 the incidence of orchitis was 16 per cent., in 1917, 15 per cent., and in January–August, 1918, when the disease was more severe and complications more frequent, 25 per cent. He found that atrophy of the testicle after orchitis was much rarer than is usually supposed, and as a rule the organ returned to its normal condition. Similar views are held by Bénard, who has always found a persistence of sexual activity after mumps orchitis and has never observed azoospermia,

even when both testicles had been affected. Twinem, on the other hand, holds that sterility due to testicular atrophy following mumps is not so rare as the French authors maintain, and asserts that it is often present without any loss of sexual desire or potency and without any abnormality of secondary sexual characters.

The case of feminism following mumps recorded by Laignel-Lavastine and Courbon is worthy to rank among the curiosities of medicine. Their patient was a soldier who before his attack of mumps had shown a remarkably virile temperament, characterized by great sexual appetite and vigour and love of violent exercise. The parotitis was complicated by bilateral orchitis and meningitis. In the course of the next seven months his testes and penis atrophied, the breasts increased in size, the abdomen assumed a rounded shape, and his sexual appetite and power considerably declined.

The close relationship between the frequency of mumps orchitis and sexual activity was illustrated during the war by French and German observers who emphasized the low incidence of this complication in soldiers at the front or in the beleaguered garrison of Przemyśl, where such activity was naturally in abeyance as compared with its comparatively high incidence at the base where the soldiers freely indulged their sexual appetites. (Teissier and Esmein, Bardachi and Barabas.)

Suppuration in mumps orchitis is rare, but the present writer has recently seen an example in a man who, while suffering from this condition, contracted scarlet fever and developed suppuration in the affected testicle. The prophylaxis and treatment of mumps orchitis by injection of diphtheria antitoxin was suggested many years ago by Salvaneschi and was subsequently advocated by Bonnamour and Bardin, as well as other French writers in the belief that it prevented hyperleucocytosis and increased the number

of red cells. It is, however, deprecated by Bénard and Carrieu owing to the extreme variability in the frequency of orchitis in different epidemics of mumps.

*Pancreatitis* in mumps which has recently formed the subject of an important paper by Brahdy and Scheffer, who found it in 13 out of 252 cases of mumps, is a rare but interesting complication not only on account of the acute symptoms, but because of the occasional occurrence of diabetes as a sequel. Mumps, indeed, is more frequently than any other infectious disease followed by diabetes, although such an event is uncommon, as is shown by the fact that Couronne was able to collect only nine examples, four of which were fatal, in patients aged from 6 to 42 years. Laignel-Lavastine, Barbier, and Labbé and Debré have reported cases showing that mumps may give rise to an acute curable pancreatitis characterized by transient insufficiency of the external secretion manifested by digestive disturbances or by insufficiency of the internal secretion with disturbance of the regulation of sugar.

Friedjung has recently (1928) reported two cases which he regarded as examples of primary epidemic pancreatitis in one of which laparotomy was performed, as they occurred during an outbreak of mumps, although neither patient had shown any involvement of the salivary glands.

*Encephalitis or meningo-encephalitis* is an occasional sequel of mumps as of other acute infectious diseases, such as measles, vaccinia and varicella. The prognosis is remarkably good according to Weissenbach, and Basch, who have collected 21 cases in patients aged from 3 to 36 years. In only a few instances were there any sequelæ, such as asthenia, headache, and epileptiform attacks. Cases of primary encephalitis or meningo-encephalitis in which the cerebral symptoms preceded the parotitis or were the only manifestation of mumps during an epidemic of the disease, have been described by Howard, Bedingfield, Wallgren, Zemke,

and Joltrain, Hillemand and Justin-Besançon.

*Meningitis.*—De Massary, Tochmann and Luce observed meningeal symptoms in 23 per cent. of 635 cases of mumps in soldiers and a cerebrospinal lymphocytosis in all the cases which they examined. Sometimes, it is true, the meningeal symptoms were ill-marked, but bradycardia was almost invariably present. The frequency of meningeal irritation in mumps induced the writers to recommend that mumps patients should be kept at rest for a longer period than the three weeks generally required for isolation. Mumps meningitis in men is usually associated with orchitis so that Micheleanu's case reported in 1918, in which meningitis was the only complication of mumps, is exceptional.

Involvement of the *peripheral nerves* is a rare but occasional sequel, of which cases have been recorded by Rompe and Pitres and Marchand. Thiriet, who collected 12 examples of mumps polyneuritis in patients aged from 4½ to 55 years, states that the symptoms are principally motor. All made a complete recovery in from two to six months.

Among the *rarer complications* of mumps recently described are joint affections most commonly in the form of arthralgia, much less frequently serous arthritis and very rarely suppurative arthritis (Maisondieu), oedema of the tongue (Harries), iritis (Ortega), enlargement of the thymus (Esquivel), and urethritis (Spence, Kidd).

*Diagnosis.*—Owing to the frequency with which parents and occasionally practitioners mistake hyper-toxic diphtheria for mumps, the diagnosis of mumps should not be made before making a careful examination of the fauces. Even before inspection of the throat the greater constitutional disturbance, nasal discharge and characteristic foetor, indicate the presence of diphtheria rather than mumps.

A retrospective diagnosis of mumps is justifiable in the presence of orchitis with a previous recent history

of facial swelling and absence of gonorrhœa. According to Tremolières and Caussade during the late war it was a common practice among Moroccan soldiers to simulate mumps by pricking the buccal mucosa and then forcibly inflating the cheeks. Commenting on this practice De Massery suggested that in persons suspected of simulation lumbar puncture should be performed, as in genuine mumps cerebrospinal lymphocytosis is constant, occurring early and lasting for several months.

*Prognosis.*—Mumps usually ranks with chicken-pox as one of the mildest of the acute infections. Of recent years, however, severe and even fatal cases have been recorded by French, Belgian and Italian observers. Barbato has reported a case in a man, aged 53, in whom mumps was complicated by orchitis and uræmia, probably due to a pre-existing nephritis. After subsidence of the uræmia, he developed encephalitis, death being preceded by vesical and respiratory paralysis. There was no autopsy. The case reported by Michelean in 1927 was that of a previously healthy woman, aged 34, who, in the seventh month of pregnancy, developed mumps complicated by nephritis and followed by a fatal attack of eclampsia. Delcourt's patient was a girl, aged 17, in whom gangrene of the parotid developed and was followed by fatal myocarditis. In the case reported by Sabrazès, Broustet and Beaudiment, a youth, aged 19, died on the seventh day of the disease with symptoms of acute nephritis, pulmonary congestion, epigastric pain and vomiting. The necropsy showed a massive coagulation-necrosis of the pancreas, an intense degree of acute nephritis, congestion and œdema of the lungs and slight meningeal lymphocytosis.

*Prophylaxis.*—Convalescent serum for the prevention of the disease and of its most serious and frequent complication, orchitis, has been employed by French, Danish and American observers (Debré, De Lavergne and Flandin, Teissier, Iversen and Regan), but owing

to the small number of cases reported confirmation of their results on a large scale is required.

*Treatment.*—Rest in bed during the acute stage is desirable, as in all febrile conditions, but comparative observations render it doubtful whether prolonged detention in bed renders the occurrence of orchitis less likely to occur. In view, however, of what has been said above regarding the close relationship between mumps orchitis and sexual activity, erotic excitement of any kind should be avoided as well as violent exercise, particularly cycling and riding, for some weeks after the attack.

The buccal cavity should be kept clean by a mouth wash such as the following :—

R	Pot. chlor.	-	-	-	-	-	gr. x
	Tinct. lavand.	-	-	-	-	-	m x
	Glyc. borac.	-	-	-	-	-	ʒi
	Aq. ad	-	-	-	-	-	ʒi

To be diluted with an equal quantity of warm water before use.

The pain caused by the parotid swelling is best relieved by fomentations of glycerine of belladonna.

In view of the supposed spirillar etiology of mumps, Kermorgant and others (quoted by Rommel) have recommended injections of salvarsan, but owing to the habitually mild course of the disease such treatment will rarely be required. The orchitis should be treated by a suspensory bandage and lead and opium compresses.

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# The Control of Scarlet Fever

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SCARLET fever is in some respects the most difficult disease with which the medical officer of a school or other similar community has to deal. In the first place, the diagnosis may be uncertain; a mild case may be attended by serious complications and followed by others of the greatest severity; cases may continue to occur at irregular intervals and for an indefinite time because the source of infection has eluded detection. These three aspects of the disease, namely, diagnosis, specific treatment, and prevention, confront the practitioner whenever the disease appears.

*An early and correct diagnosis* when dealing with a community such as a school is of paramount importance. Owing to the great variability of scarlet fever, both as regards type and intensity, doubtful cases frequently come under notice and call for a careful weighing of the clinical facts in the light of past experience before a definite decision can be made. An indication of the difficulty of diagnosis is the attempt clinically to subdivide and classify the disease according to type under such names as para-scarlet A, the fourth disease, para-scarlet B, and epidemic roseola. In a most careful and methodical classification on these lines, Friend<sup>1</sup> points out that while body desquamation may occur in all these types they are not mutually protective. This classification is not only of great academic interest, but has a practical bearing in a school where the medical officer has a free hand to deal with an epidemic from its inception to its end. On the other hand, such an epidemic may give rise to cases in

which these finer points of typification may not be appreciated or accepted; a diagnosis of scarlet fever, and possibly recriminations may then result.

Those who have had much experience of the disease will be familiar with the well-marked variation in intensity of cases of the same epidemic or even when single cases occur. It may happen that the first case coming under notice is quite typical and of moderate severity. This may be succeeded by others, apparently the result of direct contact, showing degrees of intensity varying from the mildest with but little malaise and pyrexia to the severe septic or hæmorrhagic types.

It is estimated that in some country districts a proportion only of actual cases come under medical treatment at the time of illness, others seeking advice on account of sequelæ referable to scarlatinal infection. On account of the disturbance of communal life caused by the appearance of scarlet fever a positive diagnosis should be made only when the clinical facts give adequate ground for such a decision; in case of doubt the diagnosis may have to be deferred until the later clinical signs make their appearance, but in the meanwhile every reasonable precaution must be taken to safeguard the community and others with whom it may come in contact. Fortunately in schools, where the living conditions are good, the disease is usually only mildly contagious; so that whatever is or is not done there is always the possibility that the disease will not spread; this, however, should never be allowed to give rise to an attitude of false security, particularly where hygienic conditions are not perfect.

Knowledge of scarlet fever can advance but slowly on the clinical side, but in the past few years bacteriology has forged new weapons for treatment and improved control. The Dicks established the serology of the *Streptococcus scarlatinæ*, and subsequently investigators have typed serologically what are now accepted as the streptococci responsible for scarlet fever and

allied infections. Using serological methods, Griffith<sup>2</sup> recognized four main types of scarlatinal streptococci, namely, types I, II, III and IV, and in addition a heterogeneous group. Types I, II, III and IV are found in approximately two-thirds of the cases of scarlet fever investigated, while in the remaining third the heterogeneous types occur. Moreover, the character of the infection produced appears to vary with the type of the infecting organism; Gunn and Griffith<sup>3</sup> found that type I more frequently gives rise to otitis media, and type II to nephritis.

Infections with these type scarlatinal streptococci produce the intensity of morbid reactions which appear to vary with both the toxigenic power of the invading organism and the antitoxic immunity of the individual. Glover and Griffith<sup>4</sup> conclude that types I to IV more usually give rise to scarlet fever, while the heterogeneous group tends to produce an epidemic tonsillitis with or without complications, but where the antitoxic immunity is low and the toxigenicity sufficiently high a scarlatinal rash may occur. These observers also point out that when the invading streptococcus is of low toxigenic power and the antitoxic immunity high there is a tendency for single cases rather than an epidemic to occur, and under these conditions the carrier rate will probably be low. On the other hand, a high carrier rate may result when these factors are reversed and when overcrowding and other unhygienic living conditions exist.

Serological investigations have resulted in the production of a toxin for active immunization and diagnostic use, and an antitoxin for establishing passive immunity as a prophylactic measure, or for use in the treatment of a case. The Dicks provided the now well-known and widely-used Dick test, by which an intradermal injection of scarlatinal toxin produces a typical circumscribed erythema in a subject who has insufficient scarlatinal antitoxin to afford specific

immunity. The blanching of a scarlatinal erythema following an intradermal injection of scarlatinal antitoxin is known as the Schultz-Charlton reaction. Both these reactions are of great value, the former in determining susceptible subjects, and the latter as an accessory means of diagnosis. The greatest care is necessary strictly to observe the essential precautions in carrying out these tests, otherwise the results obtained will be misleading.

*Immunization.*—Active immunity can be produced in most non-immune individuals by the injection of five subcutaneous doses of scarlatinal streptococcus toxin, and is useful when it is desirable to immunize healthy non-contacts for some years. Passive immunity, on the other hand, may be conferred by a single injection of scarlatinal streptococcus antitoxin in the case of non-immune contacts, but the resulting immunity lasts for a short time only.

*Treatment.*—It is important that an intramuscular injection of antitoxin should be given at the earliest stage possible, but in severe types of infection repeated doses should be used and where more rapid action is required given intravenously, diluted with normal saline. The results of serum treatment are most encouraging; the severity of the infection appears to be modified and complications, although occurring perhaps with equal frequency, are usually of shorter duration.

*Prevention.*—When a case of scarlet fever occurs, it is obviously important to trace the source of infection in order to prevent further spread of the disease. Epidemics of scarlet fever and tonsillitis have been shown to be caused by milk supplies infected with a streptococcus of either human or bovine origin. Such epidemics are usually widespread, and where a community obtains its milk from several dairies there should be no great difficulty in determining the source of infection. When any suspicion of such infective milk arises, pasteurization should be carried out

pending investigation at the source of the supply. Enquiry should be made as to the occurrence of recent suggestive illness or sore throat among all contacts, and a careful clinical investigation should be directed to the detection of any ear, nose or throat conditions of a possibly infective nature. As the result of such an investigation an epidemic of eleven cases of scarlet fever was attributed to a boy who developed otorrhoea after return to school following an attack of tonsillitis in the holidays.

Bacteriological examination of contacts should be carried out with a view to determining not only the possible source of infection, but also the existence of carriers resulting from the infecting case. Whether or not to immunize non-immune individuals must depend on the seriousness of the outbreak considered in conjunction with other local circumstances.

Instances are recorded of cases of scarlet fever occurring in small communities almost continuously over long periods of time. This may be due to the presence of carriers, and an extensive bacteriological investigation following a clinical examination may be required to determine the source or sources of infection. Glover and Griffith<sup>4</sup> point out that epidemics of scarlet fever and tonsillitis and a high carrier rate are evidence of the existence of faulty environment, usually in the form of overcrowding and inadequate ventilation of sleeping quarters.

In this connection it is of interest to record that on an occasion when an epidemic of eight cases of scarlet fever occurred in a school boarding-house for about a hundred boys, attention was focussed on the dormitory arrangements, for this spread of the disease was regarded as highly unsatisfactory and indicative of unhygienic conditions. It was found that although the house was built with a large central ventilating space there was but little through ventilation of the dormitories. Alterations were at once carried out to afford ventilation from the outer windows through the dormitories to the central ventilating space of the building.

Since this was done five years ago there has been no return of scarlet fever and the incidence and spread of infectious disease generally have markedly declined. The eight cases referred to above

gave rise to only three others in the school, and it is interesting to note that during the past eleven years the only other cases of scarlet fever recorded were five single and entirely unconnected cases.

When treating a case of scarlet fever the question of the infectivity of the patient and his surroundings arises. It is now definitely established that desquamation is not a sign of infectivity and that cases, if free from discharges, sores and enlarged glands, can be discharged with safety at the end of four weeks' isolation irrespective of desquamation.

Ker<sup>5</sup> reported that during a period of three years patients discharged from the Edinburgh City (Fever) Hospital after four weeks' isolation gave an infectivity rate of 2·8 per cent., whereas in the case of those who were kept in as a routine measure for six weeks this rate rose to 3·7 per cent. He notes that many of the patients who were retained for the shorter period were desquamating freely at the time of discharge. During the treatment of a case it is essential adequately to disinfect all articles soiled by the patient, otherwise infection may be carried to and ultimately spread by the laundry. The sick-room or ward should be entirely redecorated before being again brought into general use, and for this purpose spray painting with cellulose paint or varnish is to be recommended on the grounds of quickness and economy.

In conclusion, it is hoped that the time is not far distant when streptococcal immunity will be conferred with a single toxin injection and that its adoption will be universal, resulting not only in the prevention of much ill-health and disablement, but also in an immense saving in monetary expenditure and human lives.

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# Diphtheria

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WRITING in the second century, Aretæus thus describes the Egyptian or Syrian ulcer :  
“Ulcers occur on the tonsils; . . . such as are broad, hollow, foul and covered with a white, livid, or black concretion, are pestilential. . . . If the disease spreads to the thorax by the windpipe, it occasions death by suffocation within the space of a day.” There can be little doubt that this description of a disease which mainly affected children refers to diphtheria. Detailed and accurate descriptions of diphtheria are given by various Spanish physicians who studied the disease during the terrible epidemics of *morbis suffocans* that swept Spain during the sixteenth and seventeenth centuries. P. P. Bretonneau, of Tours, recognizing the specific character of the exudate on the affected part coined the term *diphthéríte* from the Greek *διφθέρα*, meaning “membrane.” The subsequent alteration, in 1855, to *diphthérie* is variously ascribed to Bretonneau or his pupil Trousseau.

It was as recently as 1861 that diphtheria was differentiated from scarlet fever in the returns of the Registrar-General.

The specific organism first described by Klebs in 1875 was cultivated by Loeffler in 1884. Roux and Yersin were the first to prepare diphtheria toxin. The practical value of serum therapy, due initially to the discovery of diphtheria antitoxin by Behring in 1890, may be ascribed to Roux. Antitoxic serum was first employed in England in the treatment of diphtheria in 1894.

## ETIOLOGY

The disease occurs at all ages, but its main incidence

is in childhood. Owing to a transmitted immunity faucial diphtheria is rare in the first six months of life. In this country the disease is more prevalent in the autumn and winter months. The most important cause of spread of the disease is the human carrier. In the majority of cases the bacillus lurks in the fauces or nose, but may also find a nidus in the ears, or in a skin lesion. Coughing, sneezing, kissing, and speaking result in the dissemination of the bacillus by droplet infection. Less frequently articles which have been contaminated with secretion from the nose or mouth may transmit the disease. Milk, infected from a human source, is the only food substance that may spread diphtheria. The old theory that faulty drains give rise to diphtheritic infection dies hard. The impression that cats suffer from diphtheria, or spread the infection, is erroneous.

The diphtheria, or Klebs-Loeffler bacillus, is a straight or slightly curved rod from 3 to 5  $\mu$  in length. Stained by the method of Neisser or Pugh the slightly swollen ends show darkly-stained polar granules. The bacilli remain localized to the inflammatory lesion and are only rarely met with in the blood and internal organs. A potent soluble exotoxin is produced by the bacillus.

#### PATHOLOGY

The feature of the disease which gave rise to its name and enables its clinical recognition is the formation of a membrane at the site of infection. This membrane consists of fibrin, necrotic cells and bacteria. The exotoxin of the diphtheria bacillus primarily injures the epithelial cells leading to necrosis; fibrin results from the clotting of the plasma exuded from the underlying vessels. Analogous inflammatory changes occur in the regional lymphatic glands, due in the main to the absorption of toxin. Diphtheritic infection not infrequently spreads by direct continuity



to the lungs setting up broncho-pneumonia. The powerful exotoxin enters the blood-stream and produces degeneration in the heart, peripheral nerves, kidneys, liver and adrenal glands. Myocardial changes probably play the most important part in the circulatory failure of severe diphtheria, but the vasomotor system is also at fault. Parenchymatous lesions occur in the peripheral nerves.

#### SYMPTOMS

*Faucial diphtheria.*—After an incubation period of two to four days the illness commences with sore throat, headache, general malaise and debility, anorexia, vomiting and pyrexia. In children there may not be any localizing throat symptoms until the lesion is well advanced, for by the time medical aid is summoned exudate is usually visible on the fauces. Where the membrane uniformly covers one or both tonsils, is greyish or yellowish white in colour, of firm consistence, firmly attached to the underlying mucosa, and shows a tendency to rapid spread there can be little doubt of diphtheritic infection. Apart from a rim of congested mucosa surrounding the exudate the rest of the fauces appears practically normal. Exudate on the faucial pillars or uvula is peculiarly suggestive of diphtheria. Characteristic features of a severe infection are well-marked cedema of the fauces, extensive membrane formation, and gross cervical adenitis. Owing to the palatal cedema, or the deformity arising from the glandular swelling, malignant diphtheria is not uncommonly misdiagnosed as quinsy or mumps. There is a foul smell from the inflammatory lesion. Pallor, and loss of tone of the facial muscles indicate gross toxæmia. Pyrexia is not a prominent symptom of diphtheria and is no guide to prognosis. The pyrexia frequently subsides whilst there is still extensive membrane on the fauces. Diphtheritic infection in its mildest clinically recognizable form gives rise to

discrete spots of exudate on the tonsils very difficult to distinguish from follicular tonsillitis.

*Laryngeal diphtheria* is usually due to spread of infection from the fauces or naso-pharynx, but in certain cases the laryngeal focus may be primary. Rarely the larynx may be involved by the upward spread of a primary diphtheritic process in the trachea or bronchi. Huskiness, loss of voice and a croupy cough may herald its onset. The breathing becomes harsh and attacks of dyspnoea supervene. The respiratory difficulty increases; a phase of restless struggling for breath, characterized by marked recession of the soft parts of the chest wall and the epigastrium, gradually leads to exhaustion, lividity, and death by asphyxia. Implication of the larynx is usually met with in young children. In adults the diphtheritic process has usually extended into the bronchial tree before severe dyspnoea draws attention to this rare but serious condition; toxæmia and prostration are prominent features.

*Tracheo-bronchial diphtheria* is an exceedingly dangerous, but fortunately comparatively rare form of diphtheria; it is usually due to the spread of the inflammatory process from the fauces or larynx; the condition in some patients is primary. The characteristic symptoms are severe dyspnoea, lividity, normal voice, diminution or absence of breath sounds, and hyper-resonance on percussion.

*Nasal diphtheria*.—Infection of the nose is usually associated with faucial lesions, but may occur as the sole evidence of diphtheria. Profuse rhinitis, characteristically sanious, but frequently watery or purulent, associated with membrane in the nostrils and excoriation of the upper lip are characteristic features. The associated regional lymph glands are usually moderately enlarged. Purely nasal diphtheria is usually a mild infection, but, on occasion, gives rise to severe toxæmia.

*Diphtheria of other sites*.—It is well to remember that

the diphtheria bacillus may attack the middle ear, conjunctiva, genitals, anus, skin and wounds. The presence of membrane or a sloughy or even gangrenous area of skin resistant to ordinary treatment should suggest the possibility of diphtheritic infection; the diagnosis can be confirmed by bacteriological examination and by noting the rapid improvement which follows the injection of diphtheria antitoxic serum. These atypical localizations are usually secondary to faucial or nasal lesions.

Diphtheritic infection of the fauces following tonsillectomy, which may be regarded as a form of wound diphtheria, presents peculiar difficulties in its clinical recognition; the post-operative slough simulates a diphtheritic exudate and confuses the issue. In susceptible children it is advisable to inject 1,000 units of antitoxin subcutaneously 24 hours prior to tonsillectomy.

*Hypertoxic diphtheria.*—The most prominent single feature of hypertoxic diphtheria is the occurrence of an irregularly distributed petechial or purpuric rash. Hæmorrhage from the throat, nose or bowel may also occur. Whilst the malignant type of disease may result from undue delay in antitoxin administration, in many cases the illness presents the picture of overwhelming toxæmia from the onset.

*Relapse and second attacks.*—Membrane may reappear on the fauces during the third or fourth weeks of the illness. With rare exceptions the relapse exhibits the features of a mild attack—further injection of antitoxin may not be necessary. Fully 40 per cent. of individuals with a previous history of diphtheria give a positive Schick reaction. It is, therefore, not surprising that two or more attacks of diphtheria may be met with in the same patient.

#### COMPLICATIONS

The incidence of diphtheritic paralysis varies from

10 to 20 per cent. ; the more severe the attack the more frequent and severe is the subsequent paralysis. Paralysis following a mild local lesion usually indicates that the acute stage has not been recognized. It is unusual for purely nasal or purely laryngeal cases of diphtheria to be followed by palsies. Local lesions of the skin or genitals may give rise to extensive paresis.

Cardiac failure may occur within a few days of the onset of the illness, but is more commonly delayed until the second or third week. The patient vomits; becomes restless; the face is pale with slight cyanosis of cheeks and lips; the pulse is very soft; tachycardia or bradycardia may supervene; the heart may dilate; the cardiac sounds show characteristic alterations; the blood-pressure falls; the liver enlarges; the urinary output is diminished; the mental outlook remains unclouded; death ensues.

Interference with the function of the soft palate is the commonest manifestation of diphtheritic paralysis. An early or "precocious" involvement of the palate should be regarded with anxiety as it is liable to be the forerunner of severe cardiac symptoms or the dangerous forms of late paresis. The nasal voice usually develops after the second week. Weakness of the intrinsic and extrinsic muscles of the eye may be noted as early as the third or fourth week. Paralysis of the ciliary muscle is common. Whilst the pupils react to light and accommodation the patient is unable to read. Degenerative changes in the sixth nerve give rise to squint and diplopia. Ptosis due to involvement of the oculomotor nerve is less commonly observed. In severe cases paralysis of the pharyngeal and respiratory muscles may develop during the sixth and seventh weeks. The former is manifested by inability to swallow, the latter may result in death from asphyxia. Weakness of the musculature of the trunk, face, and limbs frequently accompanies these dangerous forms of

late paresis.

Albuminuria is common during the stage of angina, but true hæmorrhagic nephritis is rare. In hypertoxic cases complete suppression of urine may accompany the other manifestations of circulatory failure.

Apart from herpetic and hæmorrhagic rashes an extraneous cause should be diligently sought to account for skin eruptions that may appear during the course of the disease. Serum and enemata are very liable to give rise to erythematous rashes.

#### DIAGNOSIS

No sick child has been properly examined unless the fauces have been carefully inspected in a good light. This dictum is particularly applicable to the diagnosis of diphtheria in young children in whom the symptoms of onset are frequently vague and insidious. In every child showing faucial exudate the entire skin surface should be carefully scrutinized as apparent membrane formation is not uncommon in scarlet fever. *Vincent's angina* is commonly mistaken for diphtheria. Infection with the fuso-spirillar symbiosis is characterized by ulceration, little tendency to spread, foul smell, very slight constitutional disturbance, and a chronic course. Examination of a direct smear, appropriately stained, will show the characteristic fusiform bacilli and spirilla. In mild attacks, more commonly met with in older children and adults, the clinical diagnosis of faucial diphtheria is frequently very difficult or frankly impossible. The tonsillar exudate may remain discretely spotted, thus simulating *follicular tonsillitis*; the deposit may be pultaceous and easily removed, yet the bacteriological evidence indicates that the infection is diphtheritic.

It is a wise rule to treat a case of laryngitis in a child as diphtheritic if there is even a suggestion of exudate on the fauces or if there is a sanious nasal discharge. Where the diphtheritic infection commences in the

larynx the diagnosis from catarrhal laryngitis can only be arrived at with certainty by direct laryngoscopy. The question of exposure to diphtheria, and examination of cultures from the pharynx and nose may help in forming an opinion. Should the respiratory difficulty increase, in spite of simple measures of treatment, 10,000 units of antitoxin should be injected without delay. Examine the buccal mucosa for Koplik's spots in every young child with symptoms of laryngitis.

An irritating blood-stained discharge from one nostril, providing a foreign body can be excluded, should always suggest nasal diphtheria. Membrane should be looked for in the nostril.

Whilst bacteriological aid is frequently of great service in diagnosis, it cannot be too strongly emphasized that the recognition of diphtheria rests primarily with the clinician. When the clinical evidence suggests diphtheritic infection, antitoxic serum should be injected immediately, and bacteriological confirmation obtained at leisure. The limitations of bacteriological diagnosis are not sufficiently realized. The isolation of morphological diphtheria bacilli from an inflamed throat does not necessarily prove that the faucial infection is diphtheritic. Conversely, experience has shown that repeated cultures from a typical faucial diphtheritic lesion with extensive membrane formation may prove negative for Klebs-Loeffler bacilli. Delay in the administration of antitoxin until bacteriological confirmation has been obtained has led to disaster in the past and will continue to do so until the clinician is prepared to act on his own initiative.

#### PROGNOSIS

The outlook of any case of diphtheria depends largely on early diagnosis and efficient treatment with antitoxin. The majority of deaths from diphtheria are due to delay in the recognition of the disease—the parents not realizing the necessity for medical advice

until an advanced stage of the local lesion. Broadly speaking, the fatality rate varies from 4 to 12 per cent. ; but may even be as high as 20 to 30 per cent. in certain epidemics. The most serious cases are those showing extensive faucial membrane with marked œdema, gross glandular enlargement, toxic pallor of the face, and profuse rhinitis. Should a purpuric rash appear, accompanied by oozing from the fauces or nose, the outlook is hopeless. When a petechial exanthem is the only hæmorrhagic manifestation there is a chance of recovery. Involvement of the larynx should always be regarded with anxiety. Respiratory obstruction and broncho-pneumonia are added dangers peculiar to this type of case.

With the exception of cardiac, pharyngeal, and respiratory involvement, the various forms of paralysis which may develop need not cause apprehension. The natural tendency is toward recovery of function.

#### TREATMENT

Clinical experience indicates that a range of anti-toxin dosage from 2,000 units in the mildest case to 50,000 units in the hypertoxic patient may be regarded as sound practice. Some authorities advocate relatively enormous doses, up to 300,000 units in malignant attacks. In gross toxæmia or laryngeal involvement 10,000 to 30,000 units should be administered intravenously. A large primary dose is preferable to smaller injections spread over two or more days. As a general rule the intra-muscular route should be adopted. The lateral aspect of the thigh is an excellent site for injection.

Ten days in the recumbent position for the mildest case should in a severe attack be extended to a minimum of six weeks. Trained nursing, always advisable, is essential in all except the mildest cases. During the acute stage glucose lemon drinks should be freely given. In malignant attacks the intravenous injection

of glucose accompanied by insulin subcutaneously is recommended. When cardiac vomiting ensues 5 per cent. glucose saline should be administered by the rectum or subcutaneously. Vigorous treatment of the inflamed fauces should be deprecated; spraying with peroxide of hydrogen, bicarbonate solution, or saline, is sufficient. Simple laxatives may be administered to mild cases, but in sharp attacks a purgative at the onset should be followed by enemas.

Drugs play a very minor part in the treatment. The routine administration of alcohol is unnecessary. When cardiac failure threatens, the judicious use of morphine will ensure rest and alleviate distress of mind and body. The foot of the bed may be raised 6 in. to 9 in. Adrenaline, camphor, caffeine, or strychnine may be employed, but do not, in the author's opinion, give results which justify their repeated injection in an apprehensive child. With the exception of the pharyngeal and respiratory forms paralyse do not require active treatment. Pharyngeal paralysis calls for lavage and frequent aspiration of secretion from the pharynx. The hypodermic injection of strychnine in full doses may be tried in the presence of pharyngeal and respiratory paralysis. Easton's syrup is useful in convalescence. Massage will hasten recovery of function in the lower limbs.

The treatment of laryngeal diphtheria is a matter for the specialist who can relieve respiratory distress either by aspiration, intubation, or tracheotomy. Tracheotomy is the only measure which lends itself to the emergencies of general practice.

#### CARRIERS

The diphtheria bacillus persists in the fauces or nose in some 3 per cent. of patients—"convalescent carriers." Carriers may also be met with who give no history of having suffered from diphtheria—"healthy carriers." It is important to ascertain whether the



diphtheria bacilli harboured by such individuals are virulent or avirulent. The carrier of avirulent germs may be regarded as harmless to the community. Tonsillectomy is the method of election for ridding a faucial carrier of virulent bacilli. The cure of the nasal carrier is frequently a difficult problem which requires the collaboration of the rhinological expert. Removal of infected adenoids is sometimes successful.

#### PREVENTION

The only effective method of stamping out diphtheria is by actively immunizing susceptible members of the community against the disease. Susceptibles can be readily distinguished from immunes by the intradermal injection of a minute dose of diphtheria toxin—the Schick test. Three intramuscular injections of diphtheria prophylactic (toxoid-antitoxin mixture, toxoid-antitoxin floccules) at fourteen-day intervals will render the majority of susceptible individuals immune to diphtheria within six months. The method is absolutely safe. A child should be immunized early in the second year. The preliminary Schick test may be omitted. In the immediate presence of diphtheria an effective passive immunity can be attained within a few hours by the subcutaneous injection of 1,000 units of diphtheria antitoxic serum; this immunity can be relied upon for at least a fortnight. To no disease may the aphorism “Prevention is better than cure” be more aptly applied.

# Non-Diphtheritic Sore Throats

By R. SCOTT STEVENSON, M.D., F.R.C.S.E.

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THE first and most important point to be noted in discussing non-diphtheritic sore throats is that one must make quite certain that a sore throat is in fact non-diphtheritic and not diphtheritic. The fact that a membrane is present is of itself no criterion of diphtheria; most of the cases I have seen with very extensive membrane all over the fauces proved not to be diphtheria at all. The so-called typical foul odour of a diphtheritic throat is very like the so-called typical fœtor of Vincent's angina. The patient with diphtheria usually looks much more ill, considering the comparatively slight lesion in the throat, than a patient with a non-diphtheritic sore throat; yet the last fatal case of a throat infection that I have seen was not a case of diphtheria but a streptococcal infection. Laryngeal diphtheria is usually considered of more serious significance than faucial diphtheria, but in a recent epidemic of severe diphtheria in Germany the high mortality rate was among severe faucial cases and not among the comparatively infrequent laryngeal cases. It must be remembered, too, that a case of undoubted scarlet fever with a membranous throat may have a genuine infection with diphtheria as well as the scarlet fever. In diphtheria the onset is comparatively slow and insidious, and the temperature is usually only about 99° or 100° F.; but much the same conditions obtain in Vincent's angina. It is said that in diphtheria the submaxillary glands are enlarged only on the affected side, while in non-diphtheritic sore throats the submaxillary glands are usually enlarged on both sides.

and these are points to note when they are present. In diphtheria, too, at least in the early stages, the knee-jerk is usually absent.

The practitioner must never, however, rely on any of these signs and symptoms when making a diagnosis of a non-diphtheritic sore throat. There is only one infallible sign, and that is the presence or absence of the Klebs-Löffler bacillus on bacteriological examination of a swab taken from the throat. Until the diagnosis is established a suspicious case should be treated as one of diphtheria. There is a rule that every practitioner should lay down for himself: *If a throat is suspicious enough to swab, it is suspicious enough for the patient to have antitoxin injected.* The antitoxin should be injected (8,000 to 10,000 units intramuscularly) without waiting for the result of the examination.

I cannot forget the case of a child I saw soon after I was qualified. The temperature was not high, about 99.5° F., and there was no membrane in the throat, though the throat was dirty. I took a swab from the throat, prescribed local treatment, and took the swab along to the local public health office for examination. I was rung up next morning and told that the swab was positive for diphtheria, and I went at once to the child's house armed with antitoxin and a syringe. But when I knocked at the door I was told that the child had just died.

When the temperature of a patient with a sore throat is up to 103° or 104° F. it is practically certain

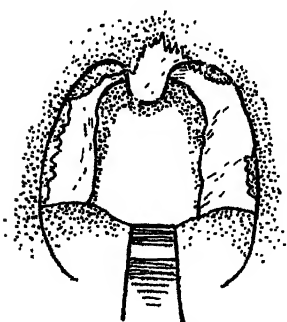


FIG. 1.—Case of membranous sore throat due to hæmolytic streptococcal infection; Hoffmann's bacillus also present in small numbers.

not to be a case of diphtheria, and is most likely to be a streptococcal infection. A child with an acute streptococcal tonsillitis may not complain of a sore throat at all, and a practitioner should always remember that the clinical examination of a child is not complete unless the throat has been examined. So-called diphtheroid inflam-

mation of the throat is usually due to the streptococcus; it may be accompanied by the staphylococcus, pneumococcus or Hoffmann's bacillus—the pseudo-diphtheria bacillus, which may also be found associated with the Klebs-Loeffler bacillus in cases of true diphtheria, as well as in the throats of healthy persons.

I well remember the case, nearly twenty years ago, of a patient I was attending for a friend who had been called abroad suddenly. Sir Thomas Barlow came down in consultation and took one glance at the chart before going in to see the patient. "It's not diphtheria," he said bluntly, "did you take a swab?" I said that I had not taken a swab personally, but that my friend had done so, had had it examined and I had no doubt whatever that it was positive for diphtheria: the patient had had antitoxin, her family had been sent away, she was isolated and two nurses were in attendance. I asked, with some diffidence, why Sir Thomas was so certain it was not diphtheria before he had even seen the patient. "Look at the chart," he said, "the temperature was up to 103° and 104° for some days—too high for diphtheria; a septic throat if you like, but not diphtheria. Anyhow," he added, "take another swab." I took another swab and the bacteriologist reported: "Hoffmann's bacillus, no diphtheria bacilli." Not satisfied, I took still another swab, and again I got back the report: "Hoffmann's bacillus only." Eventually my friend came home and I handed over his patient. "Sir Thomas Barlow seemed very certain that she couldn't have had diphtheria," I said, "I suppose that first swab *was* positive?" "No, it wasn't," he replied, "it was negative, but I don't trust these bacteriologists too much; I know diphtheria when I see it, and in any case I wasn't going to run any risks with that patient!"

#### ACUTE TONSILLITIS

Although acute tonsillitis is often subdivided into various varieties, such as acute catarrhal tonsillitis, acute lacunar tonsillitis, and acute parenchymatous tonsillitis, in reality these are merely different stages of the same disease. In acute catarrhal tonsillitis the mucous membrane covering the whole of the tonsil, which is red and swollen, is chiefly affected; acute follicular or lacunar tonsillitis is a superficial inflammation invading the crypts or lacunæ of the tonsils, characterized by spots of yellowish exudate coming from the crypts in the midst of the reddened and

inflamed tonsil; and acute parenchymatous tonsillitis is the condition when the inflammation has spread to the parenchyma or lymphoid follicles of the tonsil, the symptoms becoming intensified, and the whole throat livid.

The tonsils may be primarily infected, or the infection may be secondary to the nose or naso-pharynx; acute tonsillitis is not uncommon after operations on the nose, and I have seen both acute mastoiditis and acute rheumatism follow an attack of tonsillitis which was a sequel to a simple resection of the nasal septum. In consequence, after this or other nasal operations, the tonsils should always be painted with Mandl's paint, twice daily, for the first four or five days after the operation, unless the tonsils are so unhealthy that they should be removed at the same time.

The organism responsible for the great majority of inflammatory conditions of the throat—apart from diphtheria—is the hæmolytic streptococcus. The precise relationship between acute streptococcal tonsillitis on the one hand and scarlet fever, acute inflammation of the middle ear, acute rheumatism, acute appendicitis and epidemic catarrhal jaundice on the other, is still a matter for discussion. A recent article<sup>1</sup> by J. Alison Glover and F. Griffith seems to have established the relationship so far as acute tonsillitis, scarlet fever and acute otitis media are concerned, and Glover had previously<sup>2</sup> shown a relationship between epidemics of tonsillitis and epidemics of acute rheumatism, the peak of the rheumatism wave following the peak of the tonsillitis wave after an interval of some two or three weeks. Many of the common ailments among children of school age, such as feverish colds, naso-pharyngeal catarrh and influenza, are associated with the presence of hæmolytic streptococci in the throat, even when a sore throat is not one of the symptoms complained of. In plate cultures of throat swabs taken from patients with

acute tonsillitis, hæmolytic streptococci are almost invariably found in profuse or even pure culture; in the earliest stages of scarlet fever they can be grown from throat swabs in from 90 to 100 per cent. of cases (Glover and Griffith, *loc. cit.*). The consequences of any particular attack of acute tonsillitis—whether it be scarlet fever, acute otitis media, acute rheumatism or apparently even acute appendicitis—appear to be determined by the particular serological type or types of hæmolytic streptococci which were dominant at the original outbreak or became more and more dominant as it progressed.

*Treatment.*—The treatment I have found most useful for acute streptococcal tonsillitis is to swab both tonsils carefully all over with tincture of iodine (*tinctura iodi mitis*). If this is employed early in the course of the attack it has an almost magical effect.

I saw a child, aged 5, recently with an intense streptococcal tonsillitis, the tonsils bright red and almost meeting in the mid-line. When I examined the child his temperature was 104·5° F. I swabbed the tonsils with tincture of iodine, and when I saw him again that afternoon the temperature had dropped to 100·5° F., and he was well within 48 hours. There were no complications or sequelæ.

Another striking case I had last year was that of a famous musical comedy actress, to whom I was called one Sunday morning. Both tonsils were reddened and swollen, and there was a dirty membrane on one, but as her temperature was 103° F. I did not consider the condition was diphtheria. However, I took a swab from her throat, injected 8,000 units of diphtheria antitoxin, and swabbed her tonsils all over with tincture of iodine. By evening her temperature was only 99° F., and next day, as the swab was reported negative for diphtheria, she was acting and singing as if there had been nothing the matter.

Two or three applications of the iodine may be necessary, and when I say tincture of iodine I mean tincture of iodine and not Mandl's paint, which, however valuable in other cases, is not strong enough in acute streptococcal tonsillitis. The treatment is not pleasant, and the patient will not like it, but he will put up with it when he knows how much good

it will do him.

With regard to other treatment, gargles and sprays of hydrogen peroxide solution in warm water (1 part to 4) are useful, or the following prescription may be used as a warm alkaline spray or as a throat doucho with a Higginson's syringe :—

R.	Acid. carbol.	-	-	-	-	-	grs. i
	Sod. bicarb.	-	-	-	-	-	grs. v
	Aquæ ad	-	-	-	-	-	$\frac{3}{4}$ i

Salicylate of soda or aspirin, in 10-grain doses every four hours, is usually given internally; 5 grains of salol with 3 grains of phenacetin every two hours is another useful combination; and small doses of aconite may be given every hour until the pulse rate and the temperature come down. The following prescription is a useful method of giving the aconite, every hour for six or eight hours :—

R.	Tinct. aconit.	-	-	-	-	-	℥ i
	Antipyrin.	-	-	-	-	-	grs. i
	Caffein. citr.	-	-	-	-	-	grs. v
	Aquæ ad	-	-	-	-	-	$\frac{3}{4}$ i

In addition to acute otitis media and the other possible consequences of acute tonsillitis which have already been mentioned, an occasional sequel of the acute inflammation is a tonsillar or a peritonsillar abscess, the symptoms of which at first resemble those of tonsillitis.

#### PERITONSILLAR ABSCESS

A peritonsillar abscess or quinsy, strictly speaking, consists in suppuration in the tissues of the soft palate outside the capsule of the tonsil, but many so-called peritonsillar abscesses are actually intratonsillar abscesses. The abscess develops in the so-called "supratonsillar" fossa, which is wrongly named, as it is a large crypt in the upper pole of the tonsil, going right down to the capsule; it is sometimes more correctly termed the tonsillar fossa or intratonsillar

fossa or crypta magna. The infection enters, then, by way of this fossa, usually preceded by an acute tonsillitis, though this may be transient and the infection of the fossa may appear to be a primary one. The abscess may burst through the capsule of the tonsil at the distal end of the fossa and form a true "peritonsillar" abscess.

One side only is usually affected, and the tonsil is pushed downwards and backwards and almost out of sight. The palate becomes congested and bulging, pain radiates upwards to the ear and downwards towards the neck, swallowing is difficult and painful, and examination by the practitioner may be difficult as the patient can hardly open his mouth. The temperature is usually elevated to about  $102^{\circ}$  or even up to  $104^{\circ}$  F. Pus forms about the third or fourth day of the illness, and immediate relief follows evacuation of the pus.

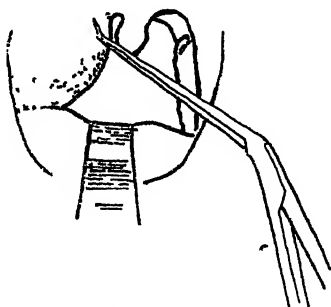


FIG. 2.—Method of opening a quinsy; the forceps are inserted well into the tonsillar fossa and opened.

*Treatment.*—It is usually stated that the point of entry for opening a quinsy is immediately above a horizontal line drawn through the base of the uvula and just external to a vertical line drawn through the anterior pillar of the fauces. I have found it better to avoid opening into the soft palate and, instead, to find the opening of the tonsillar fossa, and push a pair of sinus forceps well into it to the depth of an inch or two, and then open them widely to allow the pus to gush out. In the unusual event of this procedure not reaching the abscess it may then be necessary to go through the soft palate with the sinus forceps.

#### VINCENT'S ANGINA

Vincent's angina is an infection of the tonsils



characterized by deep ulcerations of one or both tonsils, caused by a fusiform bacillus and a specific spirillum; it has been suggested that both of these are modifications of the same organism. The condition used to be looked upon as a comparatively rare one, but during the war it was quite frequently met among the soldiers, usually in association with unhealthy teeth and gums, and since the war it has been not at all uncommon; most of the cases I have seen recently have been young women. Its

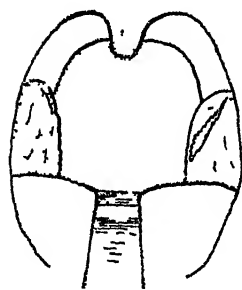


FIG 3.—Case of Vincent's angina, with deep ulceration in left tonsil.

chief importance is because of its resemblance to diphtheria and also to syphilis affecting the tonsil; it is said to give a positive Wassermann reaction, though this has been denied by some careful workers.

The patient complains of a sore throat affecting one or both sides, and the temperature may be up to 99° or 100° F. The mouth has a characteristic unpleasant foetor, and on examination a dirty, greyish, deep ulcer is found on one or both of the tonsils. The sore throat, the comparatively low temperature, the foetor and the grey ulcer make one think at once of diphtheria, but the patient is not so ill or depressed as he would be with diphtheria. Be that as it may, if the practitioner is uncertain whether the case is diphtheria or not, he must run no risks with his patient, but take a swab from the throat for bacteriological examination and give an intramuscular injection of 8,000 to 10,000 units of diphtheria antitoxin.

*Treatment.*—Until the result of the bacteriological examination is received the only treatment necessary is a mouth wash and a throat spray of hydrogen peroxide solution in warm water, to which a teaspoonful or two of glycerine of thymol may be added to make it more pleasant. When the bacteriologist

has reported that the case is definitely one of Vincent's angina, the best treatment in my opinion is the local application of salvarsan or neosalvarsan. Various other methods of treatment have been advised, such as applications of vin. ipecac. and liquor arsenicalis in equal parts (that was used a great deal in the war), or perborate of soda, or methylene blue, or trichloroacetic acid. Most of the cases I have seen have cleared up rapidly on applying neosalvarsan to the ulceration two or three times a day for a few days.

Break a tube of neosalvarsan, take a small piece of cotton-wool and wrap it round the end of a probe; moisten it in glycerine and dip it into the neosalvarsan powder so that the powder adheres all over it, and apply this into every corner of the ulcer. The neosalvarsan tube can be stoppered with a piece of sterile cotton-wool, and one or at most two tubes of the powder should suffice for a case. For a very obstinate case it may be necessary to give an intravenous injection of neosalvarsan in addition to the local treatment.

#### OTHER CONDITIONS

Acute septic pharyngitis, hospital sore throat and gangrenous sore throat are really synonyms for advanced stages of the condition described under acute tonsillitis, though, rarely, the infection has been shown to be due to the pneumococcus or even *Bacillus coli*. In Ludwig's angina the infection has spread to the floor of the mouth and below the jaw. Herpes of the pharynx is rare, but the possibility should be borne in mind, and pemphigus in the throat has also been described.

#### References

<sup>1</sup> Glover, J. Alison, and Griffith, F. : *Brit. Med. Journ.*, 1931, ii, 521.

<sup>2</sup> Glover, J. Alison : *Lancet*, 1930, i, 500.

# The Treatment of Whooping Cough

BY ARTHUR J. TURNER, M.B., B.S.

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WHOOPING cough, a typically epidemic disease, is stated to have the highest mortality, next to scarlet fever, of all the diseases of children. This, however, is due chiefly to the number and serious nature of its complications and sequelæ, of which bronchitis, broncho-pneumonia, pleurisy, convulsions, emaciation, atelectasis, and possibly phthisis and nephritis are the most important, and not to the virulence of the Bordet-Gengou bacillus, which is now generally admitted to be the specific cause of the disease, and the toxins of which acting upon the nervous system are supposed to give rise to the characteristic paroxysms. There is little doubt that infection is conveyed by means of inhalation of the virus, which may take place directly from person to person through the breath, or indirectly through infected clothing or articles on which are coughed-up atoms of sputa.

The incubation period is variously stated as from 4 to 14 days, more often from 8 to 10 days. My own cases have seldom arrived early enough for me to form any opinion on the question; and, generally speaking, parents do not appeal for advice until the whooping has commenced. The most infective period, that of catarrh lasting from 7 to 10 days, is therefore over before treatment is applied for, otherwise isolation and other effective measures for preventing the spread of the disease would be possible at an earlier date than it is, to the great advantage of the community. But during the incubation period infection of any particular individual may only be guessed at, and during the

first stage (of fever and catarrh) diagnosis is impossible.

Every case of whooping cough, once diagnosed or suspected on sufficient grounds, should be isolated, if possible, from other young children. After the age of 5 years liability to infection diminishes with every year of age, but under 5 years the case mortality is sufficiently high to warrant the greatest care in preventing the spread of the disease. I believe also that where isolation is impossible young children who have been in contact with the patient should be treated for 10 days either by the ultra-violet ray method described in this article in order to raise their resistance, or by such a mixture as the following:—

R.	Creosoti	-	-	-	-	-	-	℥ x
	Pot. iodidi	-	-	-	-	-	-	gr. xx
	Sp. rectificati	-	-	-	-	-	-	℥ xl
	Liq. ext. glycyrrhizæ	-	-	-	-	-	-	℥ i
	Aq. ad.	-	-	-	-	-	-	℥ iv

Dose for a child of 5 years, 2 teaspoonfuls four-hourly.

G. F. Still insists that the disease must be attacked in an early stage, but there is little to aid one in an attempt to diagnose a case in the pre-paroxysmal stage beyond the presence of a very pronounced lymphocytosis. The leucocytes generally are increased to 20,000 to 30,000 or more, of which the lymphocytes number as many as 60 per cent. Treatment, therefore, has to be adopted on suspicion of whooping cough in the first (catarrhal) stage, or, in the second, on the existence of vomiting and the paroxysmal cough.

#### TREATMENT

A. F. Voelcker,<sup>1</sup> in 1925, wrote of this disease as follows:—

The treatment of whooping cough constitutes one of the reproaches to the art of medicine. We have no method by which we can shorten the disease, nor can we do more than pilot the case to recovery, modifying symptoms, guarding against complications and making our patient as comfortable as we can during an illness which has no rival in its discomforts. A specific for whooping cough

has yet to be found. To all those I have tried (and they are over thirty in number) the handwriting on the wall is literally applicable : *Tekel* ("Thou art weighed in the balance and art found wanting").

We must all have been moved time after time by the distress caused to the child itself and in little less degree to the parents when paroxysms of the characteristic cough and vomiting occur. To which is added the anxiety of the latter as to the final result and the gradual loss of strength, through sleepless nights and want of nourishment, to the sufferer, and the loss of sleep to mother and the family generally.

I cannot find in the literature much hope of Voelcker's pessimistic opinion being gainsaid, with the exception of one reference, to be mentioned later. There is hardly, even in Oustric's report in 1929<sup>2</sup> of the results of his treatment with the Bordet-Gengou vaccine, sufficient warrant for its general use, since 14 out of 48 cases (30 per cent.) "showed little or no improvement." I do not think that intra-muscular injections of ether are much used now, although they had a vogue some years ago. Since the occurrence of certain cases of necrosis and abscess at the site of injection and of nerve paralysis through damage to the sciatic nerve, ether has been administered in combination with olive oil per rectum, in doses of half a drachm of ether to half an ounce of oil twice daily. I had myself on several occasions previous to my experiments with the ultra-violet rays given the drug intra-muscularly in doses of 1 c.cm. daily or on alternate days, for three to six injections. The site usually chosen was into the deltoid muscle, and the amount given, 1 c.cm., followed two days later by a dose of 23 minims. In all my cases the effect upon the paroxysms was more or less satisfactory and no ill-effects occurred.

However, there is, as stated above, one exception to the general pessimistic tone in regard to this disease, namely, the statement made in 1925 by E. H. and W. K. Russell<sup>3</sup>: "We have had opportunities of

treating a large number of cases of whooping cough by means of ultra-violet radiation and the results have been uniformly successful." Having read this statement I determined to test its value for myself, and during 1926-29 I treated with ultra-violet rays from a mercury-vapour lamp such cases as I met with in my practice and also a few which occurred among my in-patients at the Uxbridge Joint Isolation Hospital. My success has been almost identical with that of the above workers, and I should not now think of treating any case of whooping cough, free of complications, by any other means.

Before detailing my method of applying the ultra-violet light I should like to point out what the advantages of this form of treatment are. First, there is no uncertainty as to the medicine being retained; next, there is no unpleasantness of taste to add to the child's distress; neither is there the fright of needle injections. The control of symptoms is speedy, if not wholly, at least in part. There is, therefore, less loss of nourishment and of strength, less mental as well as less physical distress, less cough and, therefore, more sleep. So much is this the case that my patients invariably concluded their attack in a better condition than they commenced, and were in no need of being sent to the country for a costly convalescence. Symptoms had all disappeared and the child was apparently cured, on an average, in twenty days. One case recovered after seven days' treatment, another after nine, but none lasted more than four weeks. This compares very favourably indeed with the six to eight weeks or more of past experience. In every case the diagnosis was beyond doubt, and in no case did any serious complication occur. This freedom from complications I believe to be due to the rapid improvement in symptoms and general condition of the patient. The youngest patient in my series was a baby of eight months, and a very severe case, but the improvement

was immediate and uniformly progressive. The average age was five.

My plan was to expose the whole body to the ultra-violet rays at a distance of 36 in., the patient lying down, first on the back and then prone. Until the principal symptoms had disappeared this exposure was made once a day and then twice a week for one or two weeks. The first dose varied with the age of the child from half a minute to two minutes both to back and front. Each day the dose was increased, in the youngest by half a minute each day, in older ones by one minute each day. I am not a believer in large doses, especially when given every day, as it is very important *not* to produce any pigmentation of the skin, such pigmentation when produced tending to obstruct the passage of the rays.

The improvement in the patient's general condition is usually noticeable from the first exposure to the light, and consists in an obvious brightening and happiness, increase in the amount of sleep obtained, increase of appetite, and later in tonicity of muscles, and if old enough, a readier response to questions put. Parents have been enthusiastic about the changes produced.

Among the advantages of this method of treatment is that there is no country or seaside holiday during convalescence to pay for, there is less loss of school time, there is a great reduction in the debility suffered not only by the patient but by the parents through lack of sleep and loss of rest, and, where the patient is one of a family of children living, perhaps, in a small house, there is, through the period of infectivity being shortened, less risk of infecting the other children.

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<sup>1</sup> Voelcker, A. F.: Hutchison and Sherren's "Index of Treatment," 9th edition, 1925.

<sup>2</sup> Oustric: *Med. Ann.*, 1930, p. 558.

<sup>3</sup> Russell, E. M. and W. K.: "Ultra-violet Radiation and Actino-therapy," London, 1925.

# Miners' Nystagmus, its Symptoms, Etiology, and Treatment

By F. O'SULLIVAN, M.B., CH.B.

THE causation or predisposing condition leading up to the disease known as miners' nystagmus has long been under debate. Many and varied have been the theories brought forward, both from the physiological and pathological point of view. Be that as it may, the incidence of the disease has not abated to any appreciable extent. This statement has been proved by statistics taken within the last half-century.

Miners' nystagmus may be defined as a disease peculiar to coalminers, characterized by more or less prolonged rotatory oscillations of the eyeballs. It occurs in persons who have worked underground for some considerable time without any previous history of any of the following: (1) congenital nystagmus; (2) albinism; (3) total colour blindness; (4) disseminated sclerosis; (5) disease of semicircular canals; (6) Friedreich's ataxia; (7) cerebellar irritative lesions.

The main difference from these other diseases in which nystagmus occurs is that in these other diseases the nystagmus is only a physical sign associated with other definite symptoms and physical signs, which make up the clinical picture, while in miners' nystagmus the oscillations constitute the principal physical sign, giving rise to definite symptoms, which characterize this symptom complex.

Congenital nystagmus, as its name implies, is present from birth or soon afterwards; there is usually associated some congenital malformation of the eyes. As in the cases of albinism there is lack of pigment. Another associated condition in congenital nystagmus is the presence of opacities of the media, e.g. leucoma



or anterior polar cataract. The cause of the nystagmus in these cases is inability to develop normal fixation. That nystagmus is present in total colour-blindness has been attributed to the fact that vision is carried out by rods alone, and there is therefore a central scotoma (Parsons).

Nystagmus is only a physical sign in disseminated sclerosis, associated with other symptoms and physical signs, e.g. impairment of speech, tremor, spastic gait, etc. According to Gordon Holmes, nystagmus as seen by the neurologist in ordinary clinical work is due to lesions of short paths and centres in the hindbrain which may be involved by various nervous diseases, and the forebrain takes no part in its production. The usual seats of the lesions are the primary vestibular nuclei and their secondary connections as the cerebellum and portions of the midbrain. The lesions may be vascular or inflammatory in origin, e.g. tumours or abscesses; this gliosis and cavitation often extends into the descending vestibular root. He insists on the frequency of nystagmus in cerebellar disease, and states that it is of the jerky or vestibular type, and that oscillatory nystagmus of central origin is extremely rare except when the visual centre is involved. He also maintains that it is not a tremor or irregular movement of the eyes, due to discontinuous innervation, but a definitely co-ordinated movement as shown by the fact that it can occur in the presence of extensive paralysis of the external muscles of the eyes, when it can only be explained by reciprocal relaxation of the opponents.

Little is known about the pathology of true miners' nystagmus; that it is due to any lesion of the brain has not been demonstrated. Having regard for the type of the nystagmus, and the conditions under which it presents itself, it seems the consensus of opinion that, apart from the neurosis which follows the condition, it is unassociated with other nervous diseases in which

nystagmus is a symptom.

Before discussing the symptoms and physical signs of miners' nystagmus in detail, it may be well first to discuss the conditions under which the men work. Different work is allotted to each group of men, and each man receives a name according to the employment he follows :—

(1) Miners, who cut the coal.

(2) Roadmen, who keep the roads in repair underground.

(3) Repairers, who keep the sides of the workings in repair, and repair the roofs.

(4) Timbermen, who erect props and supports for roof.

(5) Rippers, who are engaged in breaking stone and other mineral matter to enable colliers (or miners) to approach working or coal face.

(6) Shot-firers, who blast away rock in cases of faulty seams, or seams where rock may be interposed.

(7) Firemen, whose work principally consists in testing for firedamp. The ordinary flame safety lamp affords the simplest means of testing for "gas." To make the test the lamp wick should be turned down until only a faint line of blue is seen over the yellow eye, or centre of the flame. The flame will then be about one-tenth of an inch high in the form of a flat arc or dome, according to the form of the wick. This preparation should be done as far as practicable in gas-free air. The lamp should now be raised slowly into the suspected atmosphere. If fire-damp is present a non-luminous flame "cap" of a paler colour than the lamp flame will appear on top of the latter.

(8) Ostlers, who look after the horses in the stable at the bottom of the mine.

(9) To these are added the managers, surveyors, under-managers, electricians, and overmen.

Miners' nystagmus may be observed in any of the above, with the exception of ostlers or electricians. It is rare in managers, under-managers or surveyors. In

order of frequency it is more common in colliers, next in order come repairers, timbermen, and rippers. An analysis made by myself of fifty consecutive cases shows a preponderance in colliers, repairers and timbermen, as shown in the following table :

Colliers (miners)	-	-	-	-	20
Repairers	-	-	-	-	10
Timbermen	-	-	-	-	8
Roadmen previously colliers	-	-	-	-	6
Surfacemen	-	-	-	-	4
Overmen	-	-	-	-	1
Others	-	-	-	-	1

From the above statistics it would appear that the condition is more prevalent in those working in poor illumination.

#### HISTORY AND SYMPTOMS

In a case of miners' nystagmus there is usually a history of having worked for some years as a miner in one or other of the above categories. Vision becomes defective and is progressively so, and seems worse at night. Objects when looked at appear to move; the patient complains of giddiness and sometimes photophobia. Other symptoms are headaches, loss of sleep, shortness of breath, and tremor of the hands. The patient in advanced cases becomes listless and complains of lack of energy. His facial appearance becomes characteristic, and may be regarded as pathognomonic of the disease, as shown in the accompanying photographs.

*Physical signs.*—These will be discussed under the following headings: (A) Oscillations of the eyeballs. (B) Blepharospasm. (C) Corneal anæsthesia. (D) Head tremors. (E) Conjunctival hyperæmia. (F) Increase of light minimum. (G) Disturbance of peripheral vision.

(A) *Oscillations of the eyes.*—The oscillations of true miners' nystagmus are smooth and usually, if not always, rotatory or pendulum-like. They are increased

by looking upwards or by what may be termed exertion reinforcement, e.g. asking the patient to stoop and look between his legs. The nystagmus is worse in poor light, and is always present at some stage of the disease. That a certain percentage of cases continue to work underground without symptoms is true.



FIG. 1—Advanced case of miners' nystagmus.

According to Dransart, 1.5 per cent. of miners in Northern France have oscillations, but 99 per cent. of these are unaware of the condition. From this it would appear that oscillations alone do not constitute the disease.

(B) *Blepharospasm* is a very characteristic physical sign, occurring in 20 out of 50 cases I have observed. In these cases it was very difficult to see the oscillations of the eyes. That the condition is inhibitory might be argued, with a view of overcoming the impulse or reflex irritation, which tends to aggravate the symptoms.

(C) *Corneal anaesthesia*.—Although the author has not previously found that this physical sign is included by writers upon the subject, he includes it as one of the important physical signs sometimes met with. It will be noted that patients suffering from miners' nystagmus often have small foreign bodies embedded in the cornea without apparent symptoms; in fact some of these

cases will have gone on to ulceration before consulting a doctor. I have observed this condition in five out of fifty cases. It is difficult to account for corneal anaesthesia. It may be due to the neurosis which often accompanies miners' nystagmus. It has been demonstrated that patients suffering from hysterical neuroses



FIG. 2.—Showing characteristic retraction of head.

have corneal anaesthesia. Again, it may be due to some toxin affecting the peripheral endings of the sensory nerves.

(D) *Head tremors*.—This is a well-marked physical sign in advanced cases (see Fig. 2). In others it is noticed that the head is held back, and the patient appears to look over the end of his nose, a typical attitude not easily missed. In the case of head tremors, this is demonstrated by placing the hand upon the patient's head and asking him to look up, at the same time exerting slight pressure upon the head. It is commonly one of the last signs to disappear.

(E) *Conjunctival hyperæmia*.—In 40 per cent. of the cases under observation, conjunctival hyperæmia was observed; this might account for the photophobia complained of, comparable to the conjunctivitis of other diseases. The author considers that the hyperæmia is due to trauma.

(F) *Increase of light minimum*.—In over 70 per cent.

of the cases examined by me, the light minimum was increased. I examined my cases by the method demonstrated by Percival at the Oxford Congress. The apparatus used consists of black and white discs with sectors of white and black of varying sizes on them, which, when rotated on a pin, show grey circles of varying intensity. In the remaining 30 per cent. of cases the light minimum was little affected.

(G) *Disturbance of peripheral vision.*—The field was greatly diminished for white, green and red, and although diminished for blue, not to the same extent.

#### ETIOLOGY

In discussing the etiology of the disease, it may be well first to recapitulate the theories which have been advanced on the subject and discuss the evidence for and against.

(1) *The position of work.*—That miners' nystagmus occurs in people who work in coal or ironstone mines is undisputed. Although the disease is observed in most classes of workers, except ostlers, it is most commonly met with in colliers and repairers. This may be due to the fact that they have to work for such long periods in constrained positions, e.g. lying on the back and looking up. This, according to Snell, Dransart, and Vieden, puts such a strain upon the levator muscles of the eyes that a myopathy results with nystagmus as a consequence. In support of this Snell, Percival and others claim that they have seen the disease in individuals who have never been coalminers, but whose occupation demands a constantly repeated upward direction of the eyes. These cases, however, are so rare as to be negligible.

(2) *Defective illumination.*—No one can realize how bad the illumination is where the miner carries on his work, not even after visiting the place, as the author has done on many occasions. Experiments show that the average candle-power of the electric lamps now in

use is 0·08 when clean and 0·03 when dirty. These lamps require careful handling when in use, and are often kept as much as six feet from the place where the miner is cutting the coal, or placed on the ground while the repairer is working in the upright position above his head. Then, again, take into consideration the atmosphere saturated in coal-dust; it has been calculated that the light falling on the coal-face may be less than  $\frac{1}{100}$  candle-power. One strong argument that defective illumination is the cause of the disease is the admitted fact that it is much less common if really observed in levels or shallow pits where naked lights are used. Of 120 patients observed by the author during a period of five years in not a single instance has a case of miners' nystagmus presented itself. It has been found by Llewellyn that the candles in use in various naked light mines give from one to two candle-power illumination, i.e. at least double that of the modern safety lamp. A new type of incandescent mantle lamp giving an illumination of nine candle-power has just been brought forward. This lamp is at present undergoing experimental tests, which, if completely successful, will undoubtedly do much to reduce the incidence of miners' nystagmus.

*Colliery factors.*—The disease appears more common in the older pits and its incidence seems to fall in the more modern ones. It has been suggested that this is due to the older type of lamps and older methods. The depth of the colliery, but not the thickness of the seam, may have some influence.

It has been suggested by Robson and others that the quality of the coal changes from highly bituminous in the south-east to anthracite in the north-west. This change is measured by the carbon and hydrogen ratio calculated on pure coal. The C/H ratio of house coal is below 17; the C/H ratio of transition house to steam coal is 17–20; the C/H ratio of hard steam coal is 20–23; the C/H ratio of anthracite coal is above 23.

Coal with a high carbon and hydrogen ratio gives off less volatile matter than those with a low C/H ratio. Robson claims that this gradual change from bituminous to anthracite coal with its associated decrease in volatile matter is also associated with a corresponding decrease in the incidence of miners' nystagmus compensation as shown in the following table, which shows a distinct fall in incidence from east to west :

	Average C/H Ratio. per cent.	Average Volatile. per cent.	Based on number of men below ground. Nystagmus per cent.
Monmouthshire - -	16.95	29.50	4.57
Glamorganshire, East -	19.25	21.19	2.22
Glamorganshire, West -	22.12	15.50	1.90
Carmarthenshire - -	24.72	11.87	1.15

Robson suggests that the disease is due to a displacement of oxygen by  $\text{CO}_2$  from the blood; this results in disease of the nervous system, due to prolonged toxic action. In opposition to this, J. S. Haldane has carried out experiments which disprove the above supposition. He has proved that poisonous gases are more concentrated in levels and shallow pits, where nystagmus never occurs. The author favours the latter's belief. Of 120 people working in levels, and kept under observation during a period of five years, in not one single instance has miners' nystagmus been observed.

*Predisposition or heredity.*—Percival considers that there is a predisposition to miners' nystagmus in those who develop the condition. That two members of the same family have been subject to the condition has been observed by the author, but neither their father nor grandfather had ever worked underground.

*Alcohol.*—Alcohol undoubtedly plays an active part as a predisposing factor in the etiology of miners' nystagmus. In the series of fifty cases under observation, in over 70 per cent. there was a history of alcoholism, and in at least 35 per cent. of long standing. Some patients stated that large doses of alcohol tend



to steady the eyes, but after the effects had passed off the condition seemed worse. According to Beattie and Dickson alcohol exerts a definite toxic action upon both nerves and muscles, but state, however, the most constant lesion to be in the muscles. In the case of nerve lesions the axis-cylinder is affected early, but in addition there is proliferation of the connective tissue cells of the endoneurium, perineurium and epineurium. That although the nerves of the legs are most commonly affected, those of the face are by no means exempt. In the case of the muscles, the fibres are diminished in size, have a homogeneous appearance, and show proliferation of their nuclei with, in addition, a considerable increase in the supporting fibrous tissue. That these changes might easily affect the tone of the eye muscles, upon which a big strain is put in carrying out their work, must not be overlooked.

*Tobacco.*—Of the fifty cases examined forty-five, or 90 per cent., gave a history of being heavy smokers. That night blindness is a symptom of miners' nystagmus and is also observed in certain cases of nicotine poisoning is a coincidence, as is the fact that not a few of these cases show a marked resemblance, pathologically, in changes of the optic disc. W. E. Dixon stated that very large quantities of nicotine paralyse the motor nerve-endings, and, like curare, those supplying the orbital muscles are first affected. That the habitual indulgence in tobacco, both in chewing and inhaling smoke to excess, as is often the history, must in due course act as a poison is obvious. Miners are not allowed to smoke underground, but they may take tobacco with them to chew. They may, therefore, smoke only during their leisure hours. Take, then, the man who smokes 100 cigarettes a week, or 14 cigarettes a day; these are smoked in the space of a few hours. These men must definitely be suffering from a greater or less degree of nicotine poisoning. It is natural, therefore, to conclude that the constant strain upon the

eyes at work may in the weak condition of the muscles in their atonic state give rise to the disease known as miners' nystagmus, which once set up would naturally continue so long as the toxic influence remained.

In support of this I have made an analysis of 100 non-nystagmic miners, the results being as follows: 40 smoked pipes mostly, did not chew, smoked few cigarettes, and did not inhale smoke; amount of tobacco consumed weekly,  $1\frac{3}{4}$  oz.; 27 smoked moderately, inhaled little, smoked cigarettes mostly, about 20 to 30 weekly; 20 smoked out of doors only, mostly pipes, chewed occasionally; amount consumed weekly,  $1\frac{1}{2}$  oz.; 13 were total abstainers from tobacco. In contrast to the above, in those suffering from nystagmus the majority were heavy smokers, smoking, chewing and inhaling to excess.

*Sunlight and ultra-violet rays.*—These important elements play a very active part in our everyday lives, but the miner, unfortunately, is compelled to earn his living underground, and in consequence is cut off from the sun's light for at least eight hours during the day. This in the end is bound to affect his vitality to a certain degree. The miner works on three shifts: Days, 7 a.m. to 2.30 p.m.; afternoons, 3.20 p.m. to 11.20 p.m.; nights, 11.30 p.m. to 6.30 a.m. Take the case of a man working days; he is forcibly compelled to live away from the sunlight for seven and a half hours each day, and by the time he rests for a few hours after his day's work the amount of sunlight he would receive is very little; indeed, he is excluded from 2,920 hours' sunlight in the year. Again, take the case of a man working afternoons; he is shut off from at least four hours' sunlight per day, in the year making a total of 1,460 hours. Again, in the case of a man working nights, rest is enforced during the day, so that when he should normally be taking fresh air and sunlight he is sleeping.

Miners' nystagmus seems to predominate in persons

who work consistently on day and afternoon shifts. At least a greater percentage of cases give a history of working days and afternoons than nights. There is no doubt that the absence of light and ultra-violet rays play a very active part as a predisposing cause of miners' nystagmus. That such is the case is shown by the rapid recovery from the symptoms in those who change their occupation to that of an open-air life and keep in the sunshine as much as possible.

*Accidents.*—Miners' nystagmus frequently becomes manifest after an injury to the eye, head, or other part of the body. From this we may conclude that shock must co-operate with other predisposing conditions. For instance, toxins circulating in the body, as a result of excess in poisons such as tobacco or alcohol, may become liberated as the result of shock. A similar phenomenon occurs in delirium tremens where shock may liberate certain toxins, giving rise to the latter condition. The author brings forward this suggestion for what it is worth; having regard to the fact that tobacco and alcohol play such an active part in miners' nystagmus.

*Errors of refraction.*—Pooley has shown, after careful investigation, that those suffering from miners' nystagmus have the same average variation in errors of refraction as the average workman.

*Focal sepsis.*—Of the fifty cases observed by the author twenty-three or 46 per cent. showed evidence of focal sepsis: pyorrhœa alveolaris, 12; nasal infections, 6; infected tonsils, 5.

*Deficiency in hæmoglobin.*—Barton states that the blood of men suffering from miners' nystagmus is deficient in hæmoglobin, the average being 75 per cent. normal.

*Deficiency in vitamins.*—During the war Ransom Pickard and G. W. Lloyd found that a certain number of men invalided suffered from nystagmus with night blindness. They attributed the condition to a mild

form of scurvy, due to lack of vitamin C (vegetables) in food. That a similar cause may be attributed to miners' nystagmus is debatable. It is, however, a consideration not to be lost sight of. In the cases under observation the author could not find just cause to include it as a factor in the etiology of the disease.

*Occupation neurosis.*—The neurotic element is probably the dominating factor in causing incapacity to work in the majority of chronic cases. Statistics obtained by the author in a group of collieries during the last five years (1926 to 1930) are as shown in the following table :

NYSTAGMUS CASES EXTENDING OVER A PERIOD OF  
FIVE YEARS, 1926–1930.

*Taken from a group comprising eight different collieries.*

	Average number men employed.	Nystagmus percentage.	Percentage drawing compensation from four months to two years.
Colliery A - -	962	0.60	0.30
Colliery B - -	1,063	1.12	0.90
Colliery C - -	1,118	1.25	0.53
Colliery D - -	1,079	1.11	0.37
Colliery E - -	1,065	0.46	0.28
Colliery F - -	1,018	0.78	0.78
Colliery G - -	908	2.20	0.66
Colliery H - -	620	2.90	1.36

There will be noted from the above statistics a comparatively large percentage drawing compensation for a long period. It is my experience that a vast proportion of these are men suffering from a more or less advanced stage of neurasthenia, and it appears the longer they obtain compensation the more neurasthenic they become.

We have therefore discussed the contributory cause of miners' nystagmus, and it may be useful for the sake of brevity to tabulate them under the following headings in the order which I consider most important :

- (1) Defective illumination. (2) Position of work.
- (3) (a) Tobacco; (b) Alcohol. (4) Focal sepsis. (5) Absence of ultra-violet rays. (6) Absence of necessary

vitamins. (7) Accident. (8) Errors of refraction. (9) Character of the coal.

*Incidence of the disease.*—Owing to the fact that miners' nystagmus has now been added to the schedule of the industrial diseases in the Workmen's Compensation Act of 1906, the public have become more conversant with the symptoms of the disease. Patients consequently present themselves for examination as soon as they suspect they are suffering from the condition. Prior to the introduction of this clause, patients seldom, if ever, presented themselves in the early stages of the disease. It is noted that only advanced cases came under observation. This undoubtedly should help in the treatment of the condition. The earlier it is diagnosed the more susceptible to treatment does it become.

Statistics made by Stassen in Belgium, and Dransart in France, show the total rate of incapacity to be approximately two cases in every thousand workmen. It is regarded that the total incapacity rate for the United Kingdom, France, Belgium and Germany is 0.2 per cent. of the men employed underground. The disease has not been made certifiable in America; this is considered to be the reason why the incidence is so low in the latter country. Apart from contributions by Hoffman, very little has been written by American authors upon the subject. The question of illumination in American mines must not be overlooked. The miners in the latter country carry the lamps attached to their headgear, with wires leading therefrom to batteries attached to their belts. This procedure would undoubtedly enable them to work in better illumination, owing to the fact that the lamp is closer to the seat of operations.

#### TREATMENT

Very little advance has been made recently in the way of treatment of patients suffering from miners'

nystagmus. The treatment usually given may be summed up in rest and fresh air. Up to the present no specific line of treatment has been brought forward. Prevention of the disease, however, is the only way of stamping it out; but until the difficulties entailed with dealing with illumination in the working of coalmines have been overcome there is little hope of the disease being included with those now "ceased to exist."

Slight advances have been made, it is true, regarding alterations in miners' lamps, use of stone-dust and painting with lime. Despite all this, the incidence of the disease has not been reduced to any appreciable extent.

My opinion is that the primary treatment should be directed to combat the neurosis. Undoubtedly lack of treatment plays an active part in the cause of neurotic symptoms, and the question of compensation a secondary concern. Cases which come under treatment early respond very well. Chronic cases, on the other hand, show little or no reaction. I commence treatment by first eliminating any possible cause which might retard the progress of treatment, such as focal sepsis, carious teeth, and infected tonsils. In those cases where there is a history of excess in tobacco or alcohol curtail the quantity taken. In the cases under my observation I have found that by cutting out tobacco and alcohol where necessary convalescence was short.

Early cases of miners' nystagmus respond very well to treatment by ultra-violet rays, especially in those where the light minimum is increased. The method used was to expose the patient's face, neck and chest to the ray at a distance of one metre, starting at three-minute doses, three times weekly, and increasing up to six minutes. Five cases responded to treatment very readily; these came under treatment early, and within six to eight weeks were back at work with little or no symptoms or physical signs. Even in those cases where neurosis was present there was a decided

improvement.

General treatment must also be employed, with attention to the bowels, exercise, and diet. Neurotic patients must be treated on the general lines prescribed for this condition, iron and strychnine (*nux vomica*) playing an active part. Change of air has been found of great benefit to the neurotic type of patient; he should therefore be advised to go to the country for a period of four to six weeks.

As miners' nystagmus very often comes only under the observation of the general practitioner, it therefore falls to his lot to treat them. In other words, the only place to treat the disease is in the area where it occurs. That ultra-violet ray acts as a curative medium I have personally observed. I would therefore suggest that an ultra-violet ray treatment centre be installed in each mining industrial area. It would help to save many thousands of pounds already being spent in compensation as a result of this disease.

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# Erythroedema or Pink Disease

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IN 1914, H. Swift,<sup>1</sup> of Adelaide, South Australia, described a condition which he called erythroedema, and though much has since been written on this subject, there has been no apparent increase in our knowledge. Swift gave a very complete picture of the group of symptoms, which has since been widely recognized. He stated that erythroedema was a disease characterized by swollen bluish-red hands and feet and disordered digestion, followed by considerable muscular paresis, occurring in children between the ages of six and sixteen months. He described fourteen cases, and considered that the condition was an angioneurosis due to intestinal toxæmia. In America similar cases have been described as juvenile acrodynia, and L. G. Parsons<sup>2</sup>, in 1930, alluded to an epidemic of acrodynia in Paris. Unfortunately, there seems to be some doubt as to the nature of acrodynia; it is said to be allied to pellagra and may even be a stage of pellagra. Since erythroedema is an easily understood word and describes accurately the outstanding symptoms, I have used that term. A study of the records of 42 cases in which a diagnosis of erythroedema or pink disease was made forms the basis of this article.

*Etiology.*—It occurs both in city and country, and does not appear to be related to the maternal health either before or after parturition. Though most cases come from the poor quarters of the city, some come from farms, where the diet and environment might be expected to be satisfactory. As a rule there has been no obvious defect in the diet of the child, but it must be observed that very few of the infants have been fed



at the breast for more than six months, though the diet often seems to have been adequate after breast feeding has been suspended. The sexes are equally affected. Recurrence is rare—most cases occur between November and March. So far examination of the stools has not thrown any light on the original cause. The nature of the symptoms suggest that the cause may be dietetic, infective, or allied to the troubles of dentition. The extreme irritability may be very prominent; it suggests an affection of the central nervous system. Infections of various kinds occur during the course of the complaint, but there is no clear evidence that the infections usually precede the characteristic signs. Abnormal dentition is a frequent but not invariable accompaniment.

*Morbid anatomy.*—No characteristic lesions have been found at post-mortem examination. Changes in the internal organs are as a rule slight. Congestion of the lungs and spleen have been noted in several cases; blood was noted in the pleural cavity in one case. A pale fatty liver such as occurs in gastro-enteritis has been described, and, in another case, a mottled liver. The broncho-pneumonia in some cases appears to have been a terminal infection. Oliver Latham has examined the brain and spinal cord from a number of cases with negative results. One case showed pallor of the crossed pyramidal tracts, and, another, lymphocytic invasion of the brain with cupping of the vessels; but in these two cases there were extraneous factors, and the diagnosis of pink disease was questionable. In the first case a congenital hydronephrosis was reported, and, in the second, pertussis preceded the fatal issue, and was the probable cause of the changes in the nervous system. Other changes in the nervous system have been recorded in Sydney, but an examination of the brain and cord of normal infants suggested that these were, perhaps, not pathogenic. The sympathetic system has been examined, but no definite abnormality

found.

*The symptoms* arise most frequently between three months and three years of age, the majority of cases occurring before two years of age. The child becomes irritable and peevish, cries readily, and is restless at night, very much as many children do while teething. Later, a rash develops, generally papular and diffuse; it is commonly called a sweat rash. The rash may be all over the body and legs, or may be more localized, it affects the face less. In a typical case the feet become bright pink in colour, the hands are affected less frequently and to a less degree; both hands and feet tend to peel after some days, and at times fissures develop on the plantar or palmar surfaces. Oedema of the feet and ankles may occur. These pink swollen feet gave the name to the condition in the first place.

The peevishness of the child is often such that the head is buried in the mother's shoulder, or in the pillow if in bed, and the child cries at the sight of a strange face. Frequently, a degree of intolerance to light is noted, the eyes being tightly closed or screwed up. The patient ceases to gain, or loses weight, and soon the limbs become thin, the face pasty and haggard, and the whole body shows a marked lack of tone, the skin being inelastic, and the joints easily flexed or extended beyond their normal range of movement; the feet may often be dorsi-flexed until the toes touch the shin. The pink papular rash tends to come and go, lasting a few days at a time, and the same may be said of the pink extremities. As a rule the child's appetite is impaired, but not so markedly as one might expect in a condition which has a fairly high death rate. The bowels are inclined to be loose. These symptoms and signs are characteristic of pink disease. Pink feet and hands, restlessness, irritability, sleeplessness, a rash, photophobia, oedema of the feet and hypotonia.

Other symptoms and signs are common; an infective focus of some kind is almost invariable, it may be

urinary (*Bacillus coli*, most often) cutaneous (boils, abscesses and septic sores), or stomatitis with ulceration of the mucous membrane of the mouth. Vomiting is not common, but some degree of diarrhoea is frequently noted. The urinary infection is rarely gross, and the stools are not usually so frequent, nor so abnormal as to constitute an outstanding feature of the disease. Two to four motions a day with greenish stools, and perhaps a little mucus, is the rule. In some cases, however, constipation of a mild degree has been noted.

Swift drew attention to the weakness of the whole body musculature, but he recorded that the tendon reflexes were never absent. Clinically, there is no definite evidence of gross peripheral neuritis; the lack of tone is most marked, the limbs are flabby and flop about, but all movements are retained in some degree. The feet and hands may be pink, or bluish red, but more often pink, and rather unlike the blue hands or feet in Raynaud's disease, or in other nervous disorders. The feet are usually much more markedly affected than the hands. Oedema is not marked as a rule; there is usually some swelling of the feet, but I have not found any pitting such as occurs in renal disease.

Wakefulness is most distressing, combined with fretfulness it forms a characteristic symptom of the condition; it often lasts for weeks and is little influenced by drugs or other measures in many cases. Fever is slight; if it occurs, it is usually associated with an infection of some kind.

Frequently the eruption of one or more teeth occurs during the course of the complaint, with increased irritability, sore gums and other signs indicating troublesome teething; lancing the gums in these cases gives marked relief. The general condition of the infant steadily declines in the more serious cases, or, at best, it remains stationary for some weeks before improvement is shown. The duration of the disorder is from three to thirty weeks; it is quite usual for the abnormal

signs to be present for two to four months. In a condition such as this the diagnosis does not depend on any exact basis, so that some cases are included which might well be classified otherwise, such as gastro-enteritis, pyelitis, dentition and so on. Even if these be excluded it will be found that considerable variation occurs in the symptoms and signs regarded as characteristic, and, in fact, the only absolutely diagnostic sign is the pink condition of the feet, and, less commonly, of the hands.

When photophobia is prominent the ophthalmologist as a rule finds no ocular cause for the symptoms. Some cases diagnosed as pink disease have a discharge from the ear and sometimes a pyogenic affection of the mastoid cells. Apart from the irritability and hypotonia, an examination of the nervous system does not reveal any obvious lesions. The difficulty of obtaining the knee-jerks in children is well known, and as paralysis is not recorded, the significance of absent knee-jerks is small. The heart is rarely affected. A polymorphonuclear leucocytosis is often found, up to 20,000 per c.mm.

*The diagnosis* is made on the pink feet, the rash, the irritability, photophobia, and other signs, in the absence of any other adequate explanation. Unless the feet are examined the child may be thought to be suffering from pyelitis, abnormal dentition, or perhaps in the early stages of tuberculous meningitis. The irritability and sleeplessness are exactly the same as in those conditions, and obviously indicate some irritation to the nervous system.

Investigation of the case histories of a number of patients shows that the symptoms and signs on which the diagnosis is made quite often follow bronchitis, gastro-enteritis, improper diet associated with ulceration about the mouth or anus, dentition, urinary infection or septic sores about the face or limbs. A possible conclusion is that the symptoms, particularly when

associated with a polymorphonuclear leucocytosis, may be due to infection occurring in an ill-nourished child, and that the pink feet and so forth are symptoms of various disorders. At the same time some cases occur, and these are the minority, in which the baby has been breast-fed, apparently with good results up to the time of onset, and there is not any evidence of infection, and leucocytosis is absent. These are the cases to which the diagnosis can most appropriately be applied. In these cases bronchitis and broncho-pneumonia may occur with fatal result.

The disease is often diagnosed in Sydney, but a study of the case records suggests that the diagnosis may not always be correct. If the hands and feet of normal infants are studied, it will be found that they are often pink, and sometimes cold; pink papular rashes are common in children who perspire freely, and hypotonia, irritability, and anorexia are frequent signs. It is only the combination of symptoms and their persistence without any discoverable cause which justify the diagnosis. Photophobia is certainly a suggestive symptom in these circumstances. Of forty-two cases in which the diagnosis of pink disease was made at the Royal Alexandra Hospital for Children, Sydney, a careful perusal of the histories revealed that in twenty-three cases the characteristic symptoms and signs occurred, the children were under observation for some weeks and no obvious cause was found for the symptoms. Among these, however, there were twelve with infections—abscesses, ulcerations or pyelitis, three with bronchitis or broncho-pneumonia, and one with healed ulcers of the colon and a patent ductus arteriosus. There were only four cases in which no other obvious condition existed; in one a child aged 12 months had a respiratory rate between 40 and 60 per minute with slight fever, and although no chest signs were found, the child recovered, and broncho-pneumonia may have been present. In 19 cases, examination of the history

revealed other possible causes for the symptoms and signs described, which were not absolutely typical of the syndrome of pink disease; pneumonia, abscesses, gastro-enteritis or gastritis coincided with the onset in several instances, and in others the signs recorded were insufficient, or the period of observation was too short, for exact diagnosis.

The post-mortem records show that many of the symptoms in pink disease also occur in other disorders; for instance in the case with patent ductus arteriosus and healed ulcers of the colon there were irritability, restlessness, hypotonia, sweating, photophobia, a rash, pink feet and hands, and fever, and the diagnosis of pink disease may therefore be questioned. In another case irritability, restlessness, hypotonia and pink extremities were recorded following an attack of pneumonia, and miliary tuberculosis was found post-mortem. In some cases the presence of a polymorphonuclear leucocytosis suggests infection, and it appears that infection may cause irritation of the sympathetic nervous system with resultant signs of pink disease.

Skiagraphy revealed the bony changes typical of rickets in some cases, but often these were absent. Pink disease is certainly not rickets, but it is quite possible that some factor lacking in the diet, even in breast-fed children, may give rise to the symptoms.

There is no doubt that the characteristic symptoms may occur without any obvious dietetic or infective cause. In such cases weekly observation in the out-patient department may show evidence during the course, of urinary infection or teething troubles, but the symptoms of pink disease both precede and follow such accidents, and they are not due to those factors alone. In the present state of our knowledge, however, these factors should be especially borne in mind, and the possibility of a dietetic or infective cause carefully investigated.

*The prognosis* is serious; but in those cases which

come under observation at an early stage, provided that infective complications such as pyelitis, bronchitis, gastro-enteritis or pyogenic affections can be controlled, the outlook is fairly good; but when broncho-pneumonia occurs, abscesses develop anew or gastro-intestinal symptoms persist, an unfavourable outcome may often be predicted. Sudden death is not rare, and as a rule no cause can be found to explain it. When recovery takes place it is complete, there are no apparent sequelæ.

*Treatment.*—The main method has been to give an adequate diet, mainly of milk, modified as may be necessary to suit the particular symptoms; the milk is made suitable for the age; egg yolk, orange juice and cod liver oil emulsion are given in almost all cases. If the child is more than six months old, carbohydrate, such as Benger's food and biscuits, is generally added. All infective foci should be treated; in pyelitis vaccine often is used, and vaccines from the organisms of nasopharyngeal secretion have been tried. The child is left at rest in the fresh air as much as possible, and lightly clad if the weather is suitable. Calcium salts, ultra-violet radiation, and radiostol have been used without conspicuous success; some recover with all methods. Chloral, bromide and Dover's powder are often given to induce sleep, insomnia being perhaps the most difficult symptom to combat.

In the absence of definite indications  $\frac{1}{2}$  drachm of cod-liver oil thrice daily, an ounce of orange juice a day, and 20 grains of potassium citrate four times a day, may be given in addition to the general measures. Undoubtedly, alkaline medication may have a good effect apart from urinary infections.

On the whole in Sydney the tendency is to treat these children as out-patients if possible, as there is an impression that they do better at home, providing reasonable care is taken, than by in-patient treatment. This impression may have come about because the

more serious cases are admitted, and often go steadily downhill in spite of every care.

In 1929, Findlay and Stern<sup>3</sup> described a syndrome in the rat resembling pink disease, due to an unknown dietetic factor; raw potatoes, yeast, raw white of egg and egg yolk prevented it; more than 5 c.cm. of milk daily was necessary for cure; raw liver cured it rapidly. This syndrome developed in rats fed on dried egg as the sole protein. In view of this there could be no harm in adding a small quantity of liver extract to the child's daily diet in pink disease.

In conclusion, in suspected erythrœdema I would say, consider the previous diet of the child carefully, look for teething troubles and rigorously treat infections.

#### References.

<sup>1</sup> Swift, H. : Australasian Medical Congress, Auckland, N.Z., Feb., 1914. See also Editorial, *Med. Journ. Australia*, 1921, i, 155.

<sup>2</sup> Parsons, L. G. : *THE PRACTITIONER*, 1930, cxxv, 146.

<sup>3</sup> Findlay, G. M., and Stern, R. O. : *Arch. Dis. Child.*, 1929, iv, 1.



# Some Recent Advances in Medical Research

MUCH of medical research deals with studies of such a fundamental kind that the average practitioner finds it hard to see their relation to his own problems. Nevertheless, it is by fundamental research, done usually in the laboratory, that the larger advances in the prevention and treatment of disease have generally been made. In addition to all bacteriological research one may instance in this connexion the physiological and biochemical researches that have led to the discovery of insulin, the development of other forms of hormone therapy, and recent advances in nutritional science. The practitioner has, however, little time to keep abreast with a wide range of scientific literature, and it must therefore frequently happen that advances in research which would interest him escape his notice.

For this reason, it is intended to publish from time to time this year in *THE PRACTITIONER* a series of articles summarizing briefly, from the point of view of practice, some of the more recent discoveries of medical science. These notes will be based on work published in this and other countries, and references will be given so that those specially interested in any piece of work may consult the original sources. It is hoped by this means to assist the general practitioner to keep in touch with work, at present active, that is likely now or in the near future to have wide practical significance.

## THE ISOLATION OF VITAMIN D

The announcement last October<sup>1</sup> by a team of workers at the National Institute for Medical Research

that they had succeeded in isolating vitamin D in what is believed to be pure form marked a very important milestone in the progress of the science of nutrition. Increasing attention has been given in recent years to the relation of diet to health, but there have not been wanting sceptics who have felt that vitamins could never be separated from the foods containing them, as individual chemical compounds. Yet this has apparently been done in the case of vitamin D, which has been obtained as a crystalline substance, having an experimental anti-rachitic activity 400,000 times that of the best cod-liver oil. The name "Calciferol" has been given to this product.

The story of this research provides an interesting example of clinical observation confirmed and expanded by laboratory work. As pointed out in a recent letter to the medical press, cod-liver oil was frequently used in the treatment of rickets before the existence of vitamins was known. It was given because it was found to work, but its beneficial effect was at that time believed to be due merely to its high food-value. The true explanation of its action came in 1915, when Professor E. Mellanby showed experimentally that rickets was a "deficiency" disease curable, or preventable, by the inclusion in the diet of a specific food factor associated with animal fats. The subsequent stages of the work were summarized by the Medical Research Council in their thirteenth Annual Report published in 1928. These stages included the demonstration, here and in America, that the factor responsible, vitamin D, was formed when specimens of cholesterol were exposed to the rays of ultra-violet light. It has since been shown by Rosenheim and Webster that, not cholesterol itself, but a substance, ergosterol, inseparable from it by ordinary means of purification, is the actual parent of the essential vitamin which is formed from it by the action of sunlight, natural or artificial.

This discovery provided a scientific explanation of the fact, known clinically, that rickets could be improved by sunlight as well as by diet; it is now known that ergosterol is present in the external layers of human skin beyond which the sun's effective rays cannot penetrate. It is also abundantly present in yeast, from which source "irradiated ergosterol" is prepared on a large scale for therapeutic use. In its action in rickets, irradiated ergosterol belongs to the small, but increasing, group of "specific" remedies. Continuous efforts have been made to separate the active component from it. They have led, as stated, to the isolation of "Calciferol" which is thought to be pure vitamin D.

It was pointed out in the letter mentioned that rickets in England is now a comparatively rare disease, thanks largely to the excellent work done by Welfare Centres in supervising the diet of infants, and also probably to the widespread prescription of cod-liver oil to children. It may still, however, be seen in severe form at overcrowded industrial centres, and the importance of securing an adequate ration of vitamin D to children in slum districts can hardly be exaggerated. It probably matters little whether the vitamin is given in concentrated form as irradiated ergosterol or in the greater dilution of cod-liver oil, where adequate doses of this are tolerated, except that different specimens of cod-liver oil may vary greatly in anti-rachitic activity. Cod-liver oil, however, is also rich in vitamin A and other substances. Recent work by Mrs. Mellanby<sup>2,3,4</sup> has shown that vitamin D plays an important part in the development of the teeth, and probably in their resistance to caries. It has been found that a supplemental ration of this vitamin, over and above their ordinary "adequate" diet, leads to a healthier condition of the jaws and teeth of school-children.

From the practical point of view, the main signi-

ficance of the isolation of "Calciferol" lies in the fact that it gives an absolute standard, by reference to which the vitamin D activity of any remedy or food may be measured.

#### THE COMMON COLD

Practitioners are often asked by their patients, "Are anti-catarrh vaccines any use?" They generally, if wise, return a cautious reply. Undoubtedly some patients are helped by these vaccines, and the severity, if not the frequency, of their colds may be lessened thereby. In others they seem to have little effect.

New light on the etiology of the common cold has recently been shed by Professor A. R. Dochez<sup>5, 6</sup>, and his co-workers in New York. A business organization in the United States provided a large sum of money for the research, and this enabled experiments to be made with chimpanzees, which are costly animals, but apparently the only creatures other than man that are susceptible to the infection. It was found that chimpanzees, kept under conditions of rigid quarantine, could readily be given colds by the inoculation intranasally of *filtered* washings from the noses of human beings with colds. The experiments were afterwards repeated with similar success on human volunteers. The fact that the washings would produce coryza after passage through a filter which retained all visible bacteria seemed to prove that none of the latter could be primarily responsible for the infection.

If this work is confirmed—and attempts to confirm it are now being made over here<sup>7</sup>—colds must be added to the rapidly expanding group of infectious diseases shown to be due to "filter-passing viruses." It should be added that the American workers claimed, in addition, to have cultivated the virus in tissue-cultures of chicken-embryo, and to have produced colds by inoculation from these cultures, and even

from sub-cultures.

The relation of this work to the value of "catarrhal vaccines" will be evident. The streptococci, pneumococci and other organisms from which these vaccines are made, admittedly occur in quantity in the nasal secretion of cold-victims, but, on the virus hypothesis, they must be regarded merely as secondary invaders. In so far as the vaccines act, they must do so, not by preventing infection with the virus, but by limiting the activity of the bacteria whose presence may be related to the severity of symptoms and the occurrence of complications. The variable response to these vaccines may depend on the relative susceptibility of an individual to the action of the virus itself and of a particular secondary invader: the fortunate inclusion in such a vaccine of the particular organism regularly responsible for the secondary infection in a given patient may determine its usefulness. Further research must decide whether it will ever be possible to produce lasting immunity to the virus itself. The very brief natural immunity enjoyed by those who have recovered from colds unhappily makes this rather unlikely.

#### THE DIAGNOSIS OF SMALLPOX AND OF WHOOPING COUGH

In the successful control of infectious disease early and accurate diagnosis is clearly of the highest value. Without it, efficient notification is impossible and measures for checking the spread of an incipient epidemic may be seriously delayed. Particularly does this apply in the case of smallpox which often in its early stages, and sometimes throughout, may be hard to distinguish clinically from chicken-pox, and in which early vaccination of contacts may prevent disaster. It applies also to whooping cough, particularly when the latter breaks out in schools. One of the causes of the epidemic spread of this disease lies in the fact that although, from the date of onset, ten days or more may elapse before the first "whoop" is heard, it is by the occurrence of the whoop that the

infection has generally to be recognized. By this time the patient, regarded as having mild bronchitis, may have mingled freely with many other children.

The above considerations give special significance to work on these two diseases done recently in this country and abroad. In 1925 M. H. Gordon<sup>8</sup> showed that it was possible serologically to detect the virus of smallpox, whether of mild or severe type, by the "flocculation" of suspensions made from dried skin crusts taken from patients with the disease. This work has since been confirmed and extended by Burgess, Craigie and Tulloch.<sup>9,10</sup> The principle of the test is based on the fact that the viruses of vaccinia and smallpox are now believed to be identical. The whole history of human vaccination with calf lymph gives strong presumptive evidence that this is so, and additional proof has recently been got by the successful experimental conversion of variolous material into vaccinia.

In preparing for the test, rabbits are inoculated cutaneously with vaccinia calf lymph, and a suspension of the scabs so produced is inoculated intravenously into other rabbits. The serum of these latter, thus immunized to "rabbit-vaccinia," is found soon to contain antibodies which flocculate, not only with vaccinia, but also with suspensions of human smallpox scabs. It has been shown, moreover, that the reaction is specific for the viruses of these diseases, and is not determined in any way by the presence of secondary infectors in the skin.

In using the test diagnostically, the crusts from suspected cases are made into a very fine suspension with saline, and serum and antigen are then allowed to react together as in the Widal test for enteric infections. A positive result is shown by the appearance of opaque white flocculi in the previously homogeneous mixture. During the epidemic of smallpox at Dundee in 1927 the test was found to be of high value in differentiating this disease in its milder forms from chicken-pox. There is little doubt that it will come,

as occasion demands, to be generally used for this purpose in doubtful cases.

A bacteriological method for the early diagnosis of whooping cough has been developed of recent years in Denmark<sup>11</sup>, and its value has since been established also in France, America,<sup>12,13</sup> and this country.<sup>14</sup> \*

It is now known for certain that the bacillus described by Bordet and Gengou (1906) is the causative agent of this disease. It is found in no other condition; it has reproduced the disease in animals, and the serum of patients with whooping cough contains specific antibodies to it. It can be isolated in the catarrhal stage of practically every case, its isolation making the diagnosis certain within a few days of the onset. The method, which has already been widely employed abroad, consists in allowing the patient to cough on to a culture plate containing a special blood agar and potato medium. The plates which, in Denmark, are distributed to doctors, on demand, from a central laboratory, are then returned there for incubation for three days. At the end of this time, a characteristic growth of Bordet's bacillus (*Hæmophilus pertussis*) will have been obtained in almost every case of whooping cough, so that the diagnosis may be known for certain not later than the fourth or fifth day of the disease.

It seems clear that the general adoption of this test could be of great assistance to clinicians, and particularly school medical officers, in this country. It necessarily requires the co-operation of a well-equipped central laboratory, but it is to be hoped that the public health authorities will be willing to take it up if there is evidence of a demand among practitioners.

#### THE EARLY DIAGNOSIS OF PREGNANCY

A noteworthy instance of the application of funda-

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\* In this connection, the writer has also been privileged to see an advance copy of a paper by A. D. Gardner and P. H. Leslie, shortly to appear in the *Lancet*.

mental biological research to a practical problem is given by the Zondek-Aschheim test for the diagnosis of pregnancy. This has developed from an academic study of sex hormones into a diagnostic method of high value.

In 1927 Zondek and Aschheim<sup>15</sup> described experiments showing that implantations of male or female pituitary tissue into immature female mice produced precocious sexual maturity. Among the characteristic changes noticed in these mice were enlargement of the ovaries and the occurrence in them of corpora lutea and particularly of minute dark spots due to hæmorrhage into unruptured mature follicles. Later<sup>16,17</sup> these authors showed that a hormone producing effects similar to the above is excreted in the urine of pregnant women. It has been shown to be a secretion of the anterior pituitary body and it also occurs in the placenta.

The value of the test has been confirmed in this country, among others, by Allan and Dickens,<sup>18</sup> and by Crew,<sup>19</sup> and Wiesner.<sup>20</sup> It has been adopted as the basis of the work of the Pregnancy Diagnosis Station, Edinburgh University, where specimens of urine in suspected cases of pregnancy are received for diagnosis. The test appears to work as well in the early weeks of pregnancy as in the later months, a point of much practical importance. Allan and Dickens, after extensive clinical trial of the test, concluded that a positive result may be relied on in almost all cases, a negative being rather less certain. Out of a total of 237 examinations, they had only one "positive" error—in the case of a patient at the menopause. Four normal pregnancies out of 126 gave a negative test. These authors point out that the urine used for the test should be as fresh as possible; if there is likely to be delay in transit, a trace of tricresol may be put in the bottle. The slightest bacterial decomposition is liable to kill the



test animal, thus vitiating the result. Early morning specimens of urine are chosen in order to secure sufficient concentration of the hormone.

In his report on the first year's working of the Pregnancy Diagnosis Station,<sup>19</sup> F. A. E. Crew concluded that the error in the test was 2.2 per cent., and that the value of the method lay in the fact that by its means it was possible to give an almost certain diagnosis in cases which could not be decided by purely clinical methods. It should be added that the test, depending as it does on the excretion in the urine of a placental hormone, is positive not only in normal pregnancy but also in patients with retained adherent fractions of placenta, hydatidiform mole, or chorion epithelioma. It is also positive after incomplete abortion and, for a few days, after normal parturition or complete abortion. A positive test thus indicates the occurrence of pregnancy and the presence of living placental tissue, but not necessarily the presence of a foetus. A dead foetus and placenta give a negative result.

### References

- <sup>1</sup> *Nature*, October 31, 1931, 758.
- <sup>2</sup> *Medical Research Council, Special Report*, No. 140, 1929.
- <sup>3</sup> *Ibid.*, No. 153, 1930.
- <sup>4</sup> *Ibid.*, No. 159, 1931.
- <sup>5</sup> *Journ. Exper. Med.*, 1930, lii, 701.
- <sup>6</sup> *Journ. Am. Med. Assoc.*, 1931, xcvi, 1122.
- <sup>7</sup> *St. Bart. Hosp. Journ.*, Nov. 1931, xxxix, 28.
- <sup>8</sup> *Medical Research Council, Special Report*, No. 98, 1925.
- <sup>9</sup> *Ibid.*, No. 143, 1929.
- <sup>10</sup> *Ibid.*, No. 156, 1931.
- <sup>11</sup> *Comm. l'Inst. Sérothérap. de l'Etat Danois*, 1922, xii.
- <sup>12</sup> *Journ. Am. Med. Assoc.*, 1927, lxxxix, 275.
- <sup>13</sup> *Ibid.*, 1930, xc, 263.
- <sup>14</sup> *Lancet*, 1929, ii, 165.
- <sup>15</sup> *Klin. Wochenschr.*, 1927, vi, 243.
- <sup>16</sup> *Ibid.*, 1928, vii, 831.
- <sup>17</sup> *Ibid.*, 1928, vii, 1401.
- <sup>18</sup> *Lancet*, 1930, i, 39.
- <sup>19</sup> *Brit. Med. Journ.*, 1930, i, 662.
- <sup>20</sup> *Ibid.*, 1931, i, 860.

# Practical Notes

## *The Treatment of Diseases by a Ketogenic Diet*

Ketosis, or the form of acidosis due to insufficient combustion of carbohydrate in the body, is an important factor in the prognosis of diabetes mellitus and is counteracted by insulin, which enables this form of metabolism to be effected. Ketosis may occur as the result of starvation, especially in obesity, of exercise, and of a diet rich in fats and poor in carbohydrates. Recently the utilization of a ketogenic diet has become known, and in a recent number of the *Proceedings of the Staff Meetings of the Mayo Clinic* there are three articles on the subject. Barborka, while laying stress on the fact that a diet very rich in fats and low in carbohydrates, which is diametrically opposite to the average American dietary, is not a panacea, considers that it has now been employed with success for a sufficient time to justify its inclusion among the important new methods of treatment. It was first used in epilepsy, and, though counteracting any tendency to alkalosis, it is probably more fundamentally concerned in influencing the balance of the basic elements of fat and water of the nervous tissues, and it has been suggested that the benefit derived from a ketogenic diet is due to dehydration of the nervous system. Some observers have regarded migraine as the sensory counterpart of epilepsy, although the same patient seldom manifests both. Barborka has treated migraine with a ketogenic diet for four years, with the result that in 30 per cent. of the cases the disease has been controlled, in another 50 per cent. the frequency and severity of the attacks have been definitely lessened, and in approximately 20 per cent. there has not been any improvement. It has also been employed in bronchial asthma, and persons on the diet appear to be comparatively free from acute infections, such as measles, scarlet fever and common colds, but this may be due to the high vitamin A content of the diet. As the ketogenic diet is usually continued for long periods it is important to inquire if it has any untoward effects; so far no definite evidence of this has been established, but in a few cases pellagra has appeared and has at once reacted to the administration of vitamin B-2 in which the diet may be deficient; further, arrest of menstruation has been noted. A. L. Clark reports two cases of *Bacillus coli* infection of the urinary tract in which the organisms disappeared from the urine after a ketogenic diet was started. H. F. Helmholtz from experiments believes that any benefit from alkaline treatment of coli bacilluria is due to its action on the tissues and not to any effect on the micro-organisms; he concludes that the urine of patients with ketosis may contain certain substances which have a bactericidal action independently of their acidity, and reports two patients with anomalies of the urinary tract (hydronephrosis) who were rapidly cured of *B. coli* infection by the ketogenic diet; it is noteworthy that the experience of the Mayo Clinic is that infection of a urinary tract showing anatomical anomalies cannot be cured by any form of medical treatment.—(*Proceedings of the Staff Meetings of the Mayo Clinic*, 1931, vi, 608.)

*The Etiology and Treatment of Obesity*

D. M. Dunlop and R. M. Murray Lyon discuss the etiology of obesity and the results of treatment in a review of 523 cases of overweight persons. A strict classification of all cases into endogenous and exogenous types is not possible. Only 8.2 per cent. of the cases studied were definitely endogenous, while 37.2 per cent. were most probably exogenous. The remaining 53.6 per cent. were probably of a mixed type. Heredity is an important etiological factor in the production of obesity; 69.2 per cent. of the patients had overweight fathers or mothers. The most important dietetic error in overweight persons is an excessive carbohydrate intake; 45 per cent. of the cases had been excessive carbohydrate eaters. The degree of obesity is largely determined during the first few years of the condition, and thereafter the duration of obesity has, on the average, little effect on the patient's corpulence. Contrary to expectation, 59.7 per cent. of the patients claimed to be of an excitable disposition, and only 10.4 per cent. phlegmatic. There is a high incidence of gall-stones among the obese. An average loss of weight in out-patients of 1.9 lb. per week was obtained by dietetic treatment alone. Thyroid is no substitute for diet, though it may be auxiliary to it. Purely endogenous cases respond perfectly satisfactorily to dietetic treatment alone. A subcaloric diet tends to have a constipating effect on the patients. On discontinuing treatment there is a tendency for weight to be slowly regained. This can usually be avoided by only a slight modification of a normal diet. The greater the original excess weight, the more rapid is the loss under treatment and the greater the tendency to regain weight on discontinuing the diet.—(*Edinburgh Medical Journal*, October, 1931, xxxviii, 561.)

*The Treatment of Skull Fractures and Intracranial Injuries*

H. E. Mock points out that the annually increasing morbidity and mortality rate due to trauma, with skull fracture causing a high percentage of the deaths, makes this one of the great economic and medical problems of our time. It is impossible to standardize treatment, as each individual case presents its own peculiar requirements. But it is possible to give a rational routine treatment which can be applied to 50 per cent. of all skull fracture cases and then to classify the remaining cases into the following three groups: (a) Those in which rest treatment alone is sufficient (4 per cent.); (b) those who must have, in addition to routine care, the special treatment of lumbar drainage (33 per cent.); (c) those cases having definite, recognized indications for cerebrocranial operations (13 per cent.). This article is written for those practitioners away from large medical centres who are just as frequently confronted with these cases and who are sometimes led astray in their treatment by certain teachers decrying lumbar drainage, and by other teachers, extremely adept in operative technique, advocating operative intervention in skull fractures, especially decompressions. If the average practitioner will delay all X-ray examinations, undue physical examinations and operative procedures (with a rare exception) until the initial shock is over

and then will classify his cases according to their signs and symptoms, he will develop for himself a commonsense, rational line of treatment free from many of the controversial pitfalls commonly found in the management of skull fractures. Skull fractures should be treated at or near where they occur. Specialists, if desired, should be taken to the patient with the skull fracture rather than the patient to the specialist. Since, in the majority of communities, specialists in this condition are few and far between, and since the automobile has become a potential carrier of skull fractures to every hamlet, village and city in the land, it behoves all with experience in this matter to simplify and clarify the management of skull fractures to the end that the majority of practitioners can properly cope with this grave emergency when confronted with it.—(*Journal of the American Medical Association*, November 14, 1931, xcvi, 1430.)

### *Hexamine in Acute Diseases*

Minet and Duthoit in an article on this subject point out that, though hexamine is extremely successful in urinary infections when the acidity of the urine is sufficient to liberate formaldehyde, it also can exert a bactericidal and inhibitory effect on bacteria in neutral or even alkaline solutions, in which formaldehyde cannot be liberated. The intravenous injection of hexamine, advocated in 1916 by Ayerza, of Buenos Aires, exerts a beneficial influence in the early and septicæmic stage of enteric fever before the bacilli have settled down in the viscera; and even later, when this localization of the bacilli has taken place, the incidence of relapses and of complications, such as intestinal hæmorrhage and biliary inflammations, is diminished, though the duration of the febrile stage is not shortened. In cholecystitis and catarrhal jaundice intravenous injection of 30 grains of hexamine daily for five days and then intervals of a similar period gives remarkably good results. The same treatment is recommended in puerperal and other septicæmias, in post-influenzal phlebitis, influenzal lung complications, meningitis and poliomyelitis.—(*Progrès médical*, 1931, November 17, 2081.)

### *"The Fourth Venereal Disease"*

Under the name of "Nicolas and Favre's disease (benign lymphogranulomatosis)" Marianne Romme gives an account of a condition previously described by Nélaton as simple subacute inguinal adenitis with suppurating foci in the glands, by Lejars as strumous bubo of the groin, and by Marion as subacute adenitis of the groin. The disease is usually conveyed by coitus; ten to fifteen days after connection a small erosion on the glans penis appears, and one or two weeks later the inguinal glands enlarge; the liver and spleen are seldom enlarged. The skin over the enlarged glands becomes red, adherent; fluctuation may be detected, and a fistula form. It is said to deserve the name of "the fourth venereal disease." In the acute stage minute abscesses may be seen, in subacute cases plasma-cells, and in chronic cases giant cells. Aseptic puncture of closed glands gave exit to fluid which remained sterile on aerobic and anaerobic culture; but the disease has been trans-

mitted to animals, and three surgeons who wounded their fingers in operating on the enlarged glands contracted the disease, which appears to be caused by a filter-passing virus.—(*Presse médicale*, 1931, xxxix, 1713.)

### *Vaccine Therapy in Whooping Cough*

D. v. Moritz has investigated the effects of administering a vaccine prepared from the Bordet-Gengou bacillus in a series of infants with whooping cough. Infants were selected for the investigation in order to avoid the effects of suggestion or the psychical influence of injections. The vaccine was made up in concentrations of 4,000, 6,000 and 8,000 million bacilli per c.cm. and was given intramuscularly at three to four day intervals. It was found that young infants tolerated large doses of the vaccine as well as older ones, the only reactions observed being a rise of temperature, sometimes to 104° F. The earlier in the disease the vaccine was given the better results were obtained; it was of little or no value to give it if more than three weeks had elapsed from the onset of symptoms. As the early symptoms of whooping cough often pass unrecognized it is important that the vaccine treatment should not be discredited through injudicious administration late in the course of the disease. In the author's hands the vaccine given in the way he has described has proved highly successful in cutting short the attack and seemed especially to prevent the distressing vomiting so often provoked by the violent cough.—(*Fortschritte der Therapie*, September 25, 1931, 568.)

### *The Prevention and Treatment of Diphtheria*

H. v. Mettenheim contributes a review of the recent work of immunization against diphtheria and stresses the necessity of educating the public to the value of prophylactic inoculation for their children. The method adopted and recommended for active immunization is injection of Ramon's anatoxin, which ensures freedom from the dangers of anaphylaxis and in addition contains no free toxin. It produces a high concentration of antitoxin in the inoculated within 14 days. The experience of Professor v. Mettenheim in treating diphtheria has led him to suggest the following doses of antitoxin for the actual disease: for infants, slight cases and suspects, 3,000 to 5,000 units; for fairly severe cases, 6,000 to 10,000 units; and for very severe cases, 10,000 to 20,000 units in concentrated form intravenously or intramuscularly. When there is much sepsis in the throat in addition to the presence of membrane, the intravenous injection of 0.15 to 0.2 gram of neosalvarsan has been found to cause earlier separation of the membrane and to prevent cardiac complication. If these ensue the most valuable methods of treatment are by intravenous injection of glucose, digitalis suppositories and subcutaneous injection of cardiazol, caffeine and camphor. Professor v. Mittenheim is warmly in favour of universal prophylactic inoculation in view of the serious mortality attendant upon epidemic outbreaks of diphtheria in Germany.—(*Medizinische Welt*, November 7, 1931, 1593.)

# Reviews of Books

*The Laboratory in Surgical Practice.* By PROFESSOR E. C. DODDS, M.V.O., M.D., and LIONEL E. K. WHITBY, C.V.O., M.D., M.R.C.P. Modern Surgical Monographs. London: Constable & Co., 1931. Pp. ix and 187. Plates 9; figs. 13. Price 8s. 6d.

THIS is the first, and appropriately so, of the series of Modern Surgical Monographs, edited by Mr. Gordon-Taylor of the Middlesex Hospital, who is to write the monographs on gastric surgery and intestinal obstruction. This volume is the outcome of personal experience and does not aim at giving a complete account of all the possible techniques available for estimating the functional activities of the various organs; for example, no attempt is made even to enumerate the many hundred tests that have been described in connection with hepatic functions. The examination of renal function is a much simpler problem in relation to surgery than from the medical standpoint, and is considered under the two heads of the estimation of the (i) general and (ii) unilateral renal function. In the chapter on serum therapy, it is pointed out that, with increased experience, it is becoming clear that in man as contrasted with guinea-pigs there is relatively little danger of serious anaphylactic shock from repeated injections of serum; in man such allergic reactions are chiefly due to intravenous administration. There are useful accounts of the serum treatment of pneumococcal pneumonia, vaccines, bacteriophages, basal metabolism, cerebrospinal fluid and blood transfusion. In short, this is a most useful guide not only to those mainly interested in operations, but to all practitioners of the art and science of medicine.

*The Genesis of Cancer.* By W. SAMPSON HANDLEY, M.S., F.R.C.S. London: Kegan Paul, Trench, Trubner and Co., 1931. Pp. xix and 258. Figs. 113. Price 21s.

FOR more than a quarter of a century the author, now a vice-president of the Royal College of Surgeons of England, has worked, thought and written on the subject of cancer. In 1904 he gained the Astley-Cooper Prize for his essay on the "Epigastric Invasion of the Abdomen in Breast Cancer," and has consistently argued that cancer spreads centrifugally by permeation of the lymphatics, and that embolism by the blood stream is exceptional in mammary cancer even in widespread and bony metastases. In this generously illustrated volume in the Anglo-French Library of Medical and Biological Science he elaborates the thesis that local lymph-stasis, usually due to either congenital malformation or to chronic proliferative lymphangitis, is a constant precursory factor and cause of malignant disease. He gives the credit for this conception to Broussais of Paris in 1826, but is not confident that it will gain universal acceptance yet awhile. A chapter is devoted to the somewhat neglected subject of the anatomy of the lymphatics of the skin on which he years ago carried out investigations by means of injections. Cutaneous papillomas are shown to be due to local

obstruction of the lymphatics and to be associated with chronic lymphangitis. The close relation of papilloma and adenoma to cancer is then reviewed; it is admitted that clinically this sequence cannot always be observed, but it is ingeniously enforced by chapters on the pathology of lupus and lupus carcinoma. Consideration of occupational cancer, such as in tar and paraffin workers, leads up to the conclusion that chronic dermatitis caused by chemical irritants is followed by the appearance of papillomas, one of which eventually becomes a carcinoma, and that the underlying process is a chronic obstructive lymphangitis.

*Medical Emergencies.* By CHARLES NEWMAN, M.D., M.R.C.P.  
London: J. and A. Churchill, 1931. Pp. ix and 128. Price 8s. 6d.

IN this companion to *Surgical Emergencies in Practice*, in Churchill's Empire Series, the adjective "Medical" is applied to conditions the treatment of which is not mainly operative or manipulative; but tracheotomy is included within the province of "even the humblest physician," and venesection and gastric lavage naturally bear it company. Reference is made with approval to the dictum in *Surgical Emergencies* that "any case of acute abdominal pain lasting more than six hours should be seen by a surgeon." This useful handbook begins with a chapter on poisons which will be welcomed by those brought up on the late Dr. Morrell's guide to the correct treatment and have not found its successor. Subsequent chapters deal with coma, convulsions, the various forms of circulatory failure, including cardiac infarction, hæmorrhage, asphyxia, and sudden insanity.

*Modern Medical Treatment.* By E. BELLINGHAM SMITH, M.D., F.R.C.P., and ANTHONY FEILING, M.D., F.R.C.P. London: Cassell and Co., 1931. 2 Vols. Pp. 1432. Price 30s.

IN 1912, nearly twenty years ago, the late Dr. Arthur Latham and Sir Crisp English brought out a *System of Treatment*, covering the whole field of the healing art, in four volumes, and now two physicians of the same teaching hospital have written a useful account in two volumes of the treatment of medical as opposed to surgical and other diseases. The convenient plan of giving a brief account of the various diseases before discussing their treatment has been adopted, and the various systems of the body beginning with the central nervous system are dealt with methodically. The text is clearly written and does not confuse the reader by the introduction of hypotheses as to doubtful conditions or by references, except in a few instances. It is thus a work for the general practitioner rather than for the advanced student in the laboratory, and should certainly be much appreciated.

*Rheumatoid Arthritis and its Treatment: Studies from the Royal Mineral Water Hospital, Bath.* By VINCENT COATES, M.A., M.D., M.R.C.P., and LEO DELICATI, L.M.S.S.A. London: H. K. Lewis and Co., 1931. Pp. xv and 114. Figs. 12. Price 6s.

THIS work is further evidence of the way in which the physicians

of Bath are entering into the modern scientific advance of hydrology; in 1928 an important conference on rheumatic diseases was held there, and two years previously F. G. Thomson and R. G. Gordon brought out their book on "Chronic Rheumatic Diseases." In the present volume reasons are first given for employing the term "rheumatoid arthritis," introduced by the late Sir Alfred Garrod in 1859, in preference to more modern synonyms, such as infective or focal arthritis, and it is pointed out that the disease is by no means confined, as has recently been stated, to women in the child-bearing period, for among 100 cases, 38 were in men. An "elastic grouping" of joint diseases is given and a firm distinction is drawn between rheumatoid arthritis and the degenerative and metabolic forms. In the clinical picture attention is rightly directed to the systemic disturbances, such as fever, which occurred in 68 per cent. of the authors' cases, thyroid enlargement in 20 per cent., and splenic enlargement in 21 per cent. As might be anticipated from Dr. Coates' previous work, the incidence of nodules is well considered. The absence of undue pigmentation is noteworthy, for a former Bath authority, the late Dr. Kent Spender, laid much stress on its occurrence. The various forms of treatment and the adjustment of clinical and biochemical abnormalities are fully discussed, and the use of hydro-therapeutical measures and splints are well illustrated by figures.

*A Manual of the Common Contagious Diseases.* By P. M. STIMSON, M.D. Philadelphia: Lea and Febiger, 1931. Pp. 353  
Plates 2; engravings 40. Price 3.75 dollars.

THIS is an expansion of the summaries prepared for the author's lectures at the Cornell Medical College, and the information given is sound and abounds in common sense. The subjects of immunity and serum reactions are first summarized and then the various diseases: diphtheria, Vincent's angina, scarlet fever, measles, rubella, whooping cough, mumps, chickenpox, epidemic meningitis (meningococcal), and poliomyelitis are dealt with in a practical and up-to-date manner. In a chapter on vaccination against small-pox, reference is made, among the complications, to post-vaccinal encephalitis, of which only a few cases have been reported in the United States of North America. The prophylactic treatment by human convalescent and parental serum against measles is described in some detail and Herman's method of active immunization mentioned, but with disapproval.

*Clinical Notes on the Disorders of Children.* By D. W. WINNICOTT, M.A., M.R.C.P. London: William Heinemann (Medical Books), Ltd. Pp. 200. Price 10s. 6d.

THIS book is the first volume to appear of a new series entitled the Practitioners Aid Series and it can be clearly asserted that in this volume the objective has been very well achieved. The book does not pretend to be a textbook of the diseases of children; it is rather a personal record of the experience of the author on the outstanding features of sick children set down from a psychological and clinical standpoint. To attempt such a task in the brief span



of 200 pages calls for great discrimination in what is to be discarded and what is to be retained. Let it be said that the author has performed this task extremely well. The book is well produced and indexed and is enthusiastically written and, without agreeing with all the author says, the book can be thoroughly recommended to practitioners as an instructive and entertaining volume.

*An Index of Treatment.* Edited by ROBERT HUTCHISON, M.D., F.R.C.P. Tenth edition, revised. Bristol: John Wright and Sons, Ltd., 1931. Pp. xviii and 1027. Price 42s.

THIS favourite medical reference book was first published in 1907, and in its tenth edition it has been enlarged, revised, largely re-written, and re-set, to increase the scope of its usefulness. Dr. Hutchison has been assisted by some ninety different authorities in the preparation of the volume, and sometimes he has allowed them rather a free hand: for example,  $3\frac{1}{2}$  pages are devoted to pernicious anæmia, but  $25\frac{1}{2}$  pages to diabetes;  $3\frac{1}{2}$  pages to pleurisy,  $8\frac{1}{2}$  pages to diseases of the heart, but  $17\frac{1}{2}$  pages to foreign bodies in the air-passages and œsophagus (a condition infrequently treated, we imagine, by the general practitioner; even Chevalier Jackson states that of his bronchoscopy cases less than 2 per cent. are foreign body cases). Among the new subjects included are anæsthesia for children, erythræmia, glandular fever, pink disease and serum sickness; the only omission we have found is the treatment of measles by pyramidon, which deserves at least mention. The many cross-references and the alphabetical arrangement of articles make reference particularly easy.

*The Medical Directory, 1932.* London: J. & A. Churchill, 1932. Pp. cxvi and 2291. Price 36s.

THERE is no new book that the average practitioner of medicine finds more interesting than the new *Medical Directory*. One realizes that it was out-of-date directories that Charles Lamb must have meant when he included directories (which are, on the contrary, among the most fascinating of books) among his list of *biblia a-biblia*, books which are no books: "Court Calendars, Directories, Pocket Books, Draught Boards bound and lettered at the back, Scientific Treatises, Almanacks, Statutes at Large." In the 1932 *Medical Directory* are included 55,480 names, an increase of 445 from 1931, and Dr. Fortescue Fox's excellent notes on British spas and seaside resorts have been revised and brought up to date.

*Gould's Medical Dictionary.* Edited by R. J. E. SCOTT, M.A., B.C.L., M.D. 3rd edition. London: H. K. Lewis and Co., 1931. Pp. xvi and 1538. 173 tables. Price 30s.

OF the first edition of this dictionary we said some years ago that Gould had done for our medical language what Murray was doing for the mother-tongue of English-speaking peoples. Dr. Gould was the author of various dictionaries for the medical student, the medical practitioner, and for the scientific scholar respectively, and his good work in this particular dictionary—the most generally useful of them all—has been ably carried on by his successor, Dr. Scott, of New York.

## Acute Obstructive Cholecystitis

By D. P. D. WILKIE, O.B.E., M.Ch., F.R.C.S.

*Professor of Surgery in the University of Edinburgh.*

AN attack of biliary colic may be caused by the passage of a small gall-stone down the cystic duct or to its arrest at the sphincter of Oddi at the lower end of the common duct; more frequently, however, it is due to the impaction of a stone, too large to negotiate the cystic duct, in the neck of the gall-bladder or in the pouch-shaped infundibulum known as Hartmann's pouch (Fig. 1). The subsidence of the attack of colic means that the calculus has become disimpacted and has rolled back into the lumen of the gall-bladder.

We thus find that in cases in which a single cholesterol stone is present in a gall-bladder, the wall of which is not the seat of infection, recurring attacks of afebrile colic appear in the midst of good health, and passing, leave the patient without signs or symptoms. Where, however, the gall-bladder was previously infected or where the stone remains impacted and infection is superadded, we get the typical clinical picture of acute obstructive cholecystitis. The combination of the two factors of infection and complete obstruction of the outlet results in pathological

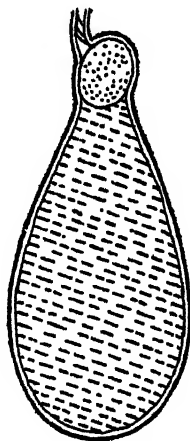


FIG. 1.—Single cholesterol stone impacted at neck of gall-bladder.

changes which depend on the nature and virulence of the infection, the physical state of the gall-bladder wall, and the age of the patient.

Whatever be the nature of the primary infection, and in our experience it is usually streptococcal, we are apt to have superadded in a continuing obstruction, infection by the common organisms of the lower bowel and, in particular, the *Bacillus coli* and *Bacillus Welchii*. The irritated gall-bladder mucosa secretes mucus which accumulates under tension, and to this is soon added the products of inflammation in the shape of desquamated epithelium and pus cells.

When the gall-bladder is still functionally active and the infection relatively mild, the acute phase of the illness lasts about forty-eight hours, during which time the gall-bladder is distended, tense, turgid and engorged. As soon as the most acute phase of the infection and the reactive inflammation is over, the gall-bladder reasserts its normal absorptive function, the tension within it lessens, and the stone tends to disimpact and free the outlet. Where the infection is more severe and the gall-bladder thickened from previous inflammation and thus less functionally active, the tendency to spontaneous resolution is decidedly less and to necrosis and leakage greater. Where the infection is heavy and virulent, and especially where anærobes, such as *Bacillus Welchii*, play a part, the chance of gangrene and perforation is considerable. Particularly is this the case in elderly subjects in whom the vascular supply is precarious and the resiliency of the gall-bladder wall impaired. A perforation of the obstructed gall-bladder into the free peritoneal cavity is very unusual. A local plastic peritonitis, involving the adjacent viscera—liver, stomach, duodenum, hepatic flexure and omentum, is the rule, and, when perforation does occur, a circumscribed abscess results.

The dangers, therefore, are not comparable to those

of an acutely obstructed appendix, in which decomposing faecal matter may lead, in the course of a few hours, to tension-gangrene and perforation into an unprepared peritoneum. Obstructive cholecystitis has, however, its own dangers owing to its proximity to and reflex nervous connections with the diaphragm, and the respiratory complications which these imply. It is a disease which on all counts is relatively harmless in the young, but serious in the aged.

### THE CLINICAL PICTURE

The early symptoms are usually those of a moderately severe but persistent biliary colic. Shiveriness, amounting sometimes to a definite rigor, may accompany the onset of pain, and a "chill on the liver" is the household diagnosis.

Vomiting frequently, but by no means invariably, attends the onset. The pain is epigastric or right subcostal, radiates to the right lower ribs posteriorly, occasionally to the tip of the right shoulder, and is aggravated by a deep breath. The temperature rises to 100° F. or more, and the pulse is moderately accelerated. The tongue is furred and often dry, and the bowels, after a preliminary looseness, are constipated. The characteristic feature on examination is the boarding of the upper part of the right rectus

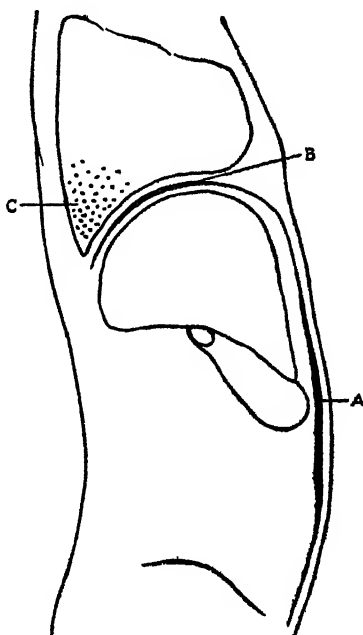


FIG. 2.—Pulmonary signs in cholecystitis. (A) Boarded abdominal muscles; (B) boarded diaphragm; (C) edema at right base.

tender on palpation. This reflex *défense musculaire* of the rectus is associated with a similar rigidity of

the right half of the diaphragm, as proved by X-ray examination.

The picture may, therefore, closely resemble a primary right-sided lung affection. The chill at the onset, the thoracic pain, the catch in the breathing, combined with the fact that, owing to the immobile diaphragm and deficient expansion of the right base, crepitations are frequently to be heard on auscultation; all these features may divert attention from the abdomen to the chest (Fig. 2). Many of my patients gave a history of previous attacks diagnosed as "congestion of the right lung." The pulmonary signs should always be looked for and assessed at their true value.

Another misleading feature may be the low-lying position of the tenderness and resistance when there is

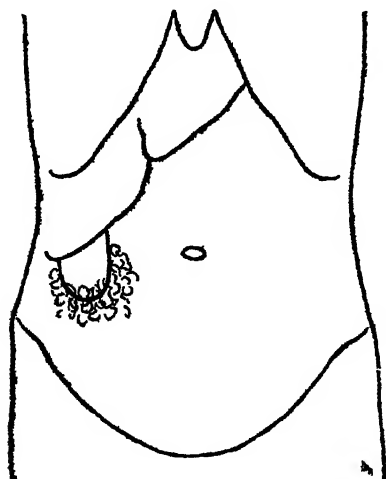


FIG. 3.—Low-lying inflamed gall bladder simulating appendicitis.

a long right lobe of the liver. In such cases the maximum tenderness and resistance are felt in the right lumbar region of the abdomen, well to the right of the umbilicus, and the question of a retrocaecal appendix abscess may arise. On careful examination, however, it is noted that the hand cannot define an upper margin of the resistance and that on percussion

the dull note over the area is continuous with that of the liver (Fig. 3).

Regarding the intestinal symptoms, it is not uncommon to have a slight attack of diarrhoea as a prelude to an attack of acute cholecystitis. When, however, the gall-bladder becomes distended and inflamed obstinate constipation is the rule. In some cases, and notably those

in elderly subjects, the chief complaint may be the obstipation and sense of abdominal distension, and, on examination of the abdomen, right-sided fullness in the iliac and lumbar regions may be noted. At first sight this may suggest some obstruction, possibly by growth, in the region of the hepatic flexure. It is due to adhesion of the hepatic flexure to the inflamed gall-bladder. The colon at this point becomes itself cedematous and inflamed, its peristalsis is, in part at least, arrested, and it acts as a potential obstruction, with consequent gaseous distension of the cæcum and ascending colon (Fig. 4).

It is usual to observe a slight but definite icteric tinge in the skin and conjunctiva within twenty-four hours of the onset of the attack. At this time also a trace of bile in the urine can always be detected. This mild icterus is due in part to inflammatory cedema around and in the wall of the common bile duct, but also in part to an accompanying hepatitis. In a few cases it is more pronounced, and in these is probably due to direct pressure of a distended Hartmann's pouch on the common duct. In my experience it is extremely rare to find a stone in the common duct in these cases.

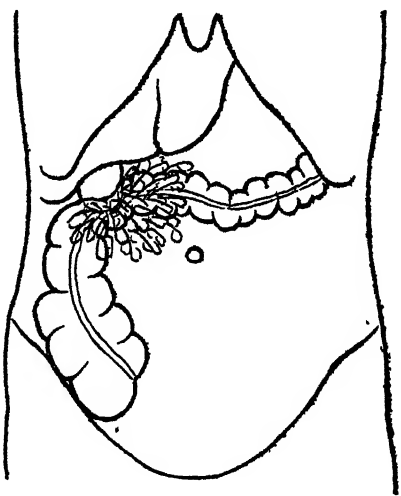


FIG. 4.—Distension of proximal colon from cedema of adherent hepatic flexure.

Examination of the blood will almost invariably show a leucocytosis. For diagnosis this is not of much significance, but for prognosis and as a guide to treatment repeated leucocyte counts may be of real value. The demonstration of a rising leucocytosis when, at

the end of forty-eight hours symptoms show no sign of abating, will point to the need for surgical interference. I would emphasize, however, that both for diagnosis and for determining the suitable line of treatment, the ordinary methods of clinical examination should suffice provided we have a knowledge of the underlying pathology.

#### PROGNOSIS

It is common knowledge that in the majority of cases an attack of acute obstructive cholecystitis will subside spontaneously. After a few days of acute illness and a week of residual discomfort, the patient may regain more or less normal health. In some cases the period of indisposition is prolonged, signs of toxæmia persist and a tender mass below the right costal margin remains. In other cases, and especially in patients over 65 years, the persistence of acute symptoms beyond forty-eight hours is accompanied by signs of pronounced toxæmia, a signal that necrosis of the gall-bladder wall has in all probability begun. If unrelieved a subhepatic or subphrenic abscess may develop, and a fatal chest complication may follow.

It is noteworthy that not a few patients who have suffered from one or more attacks of cholecystitis inherit a legacy of flatulent dyspepsia, rheumatic pains and cardiac dyspnoea. Such an attack is often the turning point between a life of activity and one of increasing care, of relative inactivity and of gain in weight.

#### TREATMENT

It may be stated at once that a diagnosis of acute obstructive cholecystitis should not be deemed equivalent to a decision for immediate operation. The latter is seldom required and may as a rule be postponed with advantage until the acute phase is over. Rest in bed with the shoulders raised, the local application of

heat, saline and glucose per rectum, and morphine and atropine hypodermically should be instituted. If after twenty-four to thirty-six hours the local rigidity and tenderness do not abate, if the pulse-rate and temperature remain up or rise, and the general condition of the patient does not improve, then the question of operative interference must be considered. In the patient under fifty years of age a further period of expectancy may be considered justifiable; in patients over sixty years further delay is dangerous, and an emergency operation under twilight sleep and local anæsthesia should be advised.

#### EMERGENCY CHOLECYSTOSTOMY

The choice of anæsthetic is important. It is desirable to avoid both ether and chloroform, the former because of the special liability to lung complication in this condition, the latter because of the hepatitis always present in some degree. A pre-operative narcotic, such as nembutal, grs. 3, or scopolamine-morphine, and the use of a local anæsthetic, aided, in some cases, by gas and oxygen for the intraperitoneal stage of the operation, will give adequate anæsthesia with minimum risk.

A transverse or oblique (Kocher) incision should be employed as respiratory embarrassment is less with either than after a vertical incision. The distended gall-bladder should, after exposure, be tapped with a large trocar and cannula and then opened and emptied. The "key-stone" which is plugging the neck must be dislodged and removed. To accomplish this, adhesions must be gently separated down to the gall-bladder neck and the stone pushed upwards by two fingers pressing from without. Unless this "key-stone" is removed a mucous fistula will persist. A large rubber drain is then stitched into the gall-bladder with catgut.

When a portion of the gall-bladder wall is gangrenous that part should be excised. A complete



cholecystectomy is not advisable in elderly patients in the acutely toxæmic phase.

#### OPERATION IN THE SUBACUTE PHASE OF OBSTRUCTIVE CHOLECYSTITIS

In the majority of cases, after two days of acute discomfort with fever, the symptoms abate, but a rounded tender swelling remains. Operation may, with advantage, be postponed for three or four days until the accompanying hepatitis has subsided and

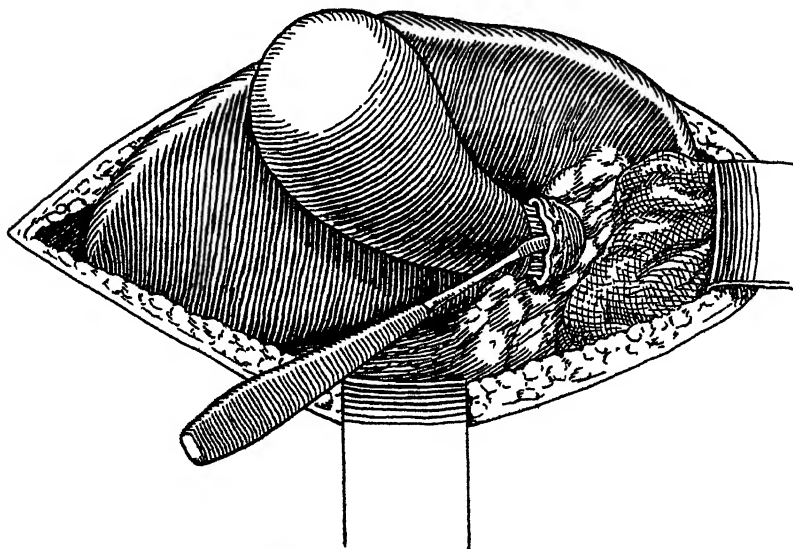


FIG. 5.—“Cuff operation” used when the ducts are obscured by cedema.

diaphragmatic movement has returned. Under general anæsthesia, preferably gas and oxygen, supplemented with a little ether if required, and with the patient's lower ribs elevated on an air-cushion, the abdomen is opened with an oblique (Kocher) incision. The recent adhesions of omentum, colon and duodenum to the gall-bladder are separated and access obtained to the gall-bladder neck. In some cases in which the gall-bladder is very large and tensely distended access is facilitated by tapping it with a large trocar and

cannula; more often this is not necessary.

The cystic duct is usually obscured by inflammatory oedema and its junction with the common duct difficult to display. It is wiser not to endeavour to dissect through the oedematous tissue surrounding the duct as troublesome bleeding may be caused or the common duct inadvertently injured. An encircling incision should be made through the thickened outer coats of the gall-bladder wall over the prominent infundibulum, and, working in the submucous layer, the cystic duct is reached and ligated (Fig. 5).

An incision is then made through the outer coats of the organ, parallel to and one-eighth of an inch from its attachment to the liver, on either side up to the fundus. By gentle stripping, from cystic duct to fundus, the gall-bladder is freed from its liver bed, the cystic vessels being exposed and ligated. No attempt is made to close over the gall-bladder bed and a large cigarette drain is inserted down to the stump of the cystic duct and brought out at the outer angle of the wound, which is closed in layers. As a safeguard against post-operative strain from coughing two through and through silk-worm gut sutures may with advantage be inserted.

Adequate exposure, gentle handling, and the avoidance of hæmorrhage are the three essentials for this operation, which has, as a rule, a remarkably smooth after-course. If for one reason or another adequate exposure cannot be obtained it is much wiser to do the simpler operation of cholecystostomy, always provided that the "keystone" at the neck is removed. In the post-operative period the Fowler position to facilitate basal expansion, and the administration of fluid and glucose to aid excretion and liver function are the essentials.

# Chronic Pain in the Lower Abdomen

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CHRONIC aching pain in the lower abdomen, worse on exertion or long standing, better when the patient rests, is one of the commonest complaints brought to the gynæcologist. The majority of these women are in the active period of sexual life, mothers of young families, overweighted with the cares and never-ending duties associated with a house and children. Rest, mental and physical, the treatment which is most likely to be beneficial, is the one which cannot be carried out, and many continue from year to year, never free from dragging aching pain while carrying out their household duties, and it is not to be wondered at that they become prematurely aged, while their tempers become frayed and irritable, and domestic happiness is impaired. Acute pain for a short time can be endured, chronic aching pain gradually wears down the most cheerful disposition and there is little doubt that more homes are destroyed by chronic aching pain than by alcohol. Chronic pain in the lower abdomen is frequently caused by slight lesions in a patient with impaired general health, lesions which in a woman of full healthy vigour would cause no inconvenience; in many it is due to a general surgical condition and in others to a lesion more properly referred to a gynæcologist.

Although I propose to discuss chiefly chronic pain in the lower abdomen, it is impossible to separate it completely from chronic pain in the back; almost all patients suffering from pain in one of these regions, due to a gynæcological condition, have pain in both

regions although it is more marked in one than in the other. The conditions which produce this pain are legion and a large number are curable by operation. Hence the necessity for thorough investigation of each case before advising any operation. If this is not done very carefully the patient may be subjected to an illimitable series of operations, as so many patients of this class will readily submit to operation after operation. The patient with chronic aching pain, depressed, irritable, careworn, tired of life as at present constituted, remembering what it was like to be pain-free, readily accepts any suggestion which promises to cure her, and if one operation fails demands another. We all have these patients and we all know how difficult it is to persuade them to try medical treatment, especially if they have had one operation and this has failed. If two operations have been performed and failed it is still more difficult to persuade her not to have a further one and she wanders round from surgeon to surgeon, seeking relief by surgical interference, until finally, losing faith in our profession, she joins the large army who bring wealth to the quacks.

The first point to bear in mind is the fact that mental and bodily weariness will produce marked symptoms from a very minor lesion and a large proportion of these patients will derive much more benefit from a month's quiet holiday away from home and family than from any operation, and so, if the patient looks tired and weary and no definite lesion, or only a slight one, can be found, the effect of general medical treatment combined with mental and physical rest should first be tried. The difficulty is to get this treatment carried out and not infrequently the benefit derived from an operation is due more to the mental and bodily relaxation while the patient is in the nursing home or hospital than to the operation itself.

This is an illustration of changing customs: in the past generation the hard-working mother obtained

her annual holiday by a ten days' puerperium spent in bed; now many seem to obtain it by a post-operative convalescence spent in the same restful surroundings.

*General medical and surgical conditions.*—Intestinal derangements are common causes of chronic or recurring pain in the lower abdomen, and although these more properly come within the province of the general physician and surgeon, the gynæcologists must always bear in mind the possibility of chronic appendicitis, visceroptosis, mobile kidney, intestinal adhesions and flatulence being the cause of the trouble. Chronic appendicitis and chronic salpingitis not infrequently occur together and still more frequently a differential diagnosis is impossible until the abdomen is opened. Therefore the gynæcologist when opening the abdomen for chronic pain must examine the appendix and conversely the general surgeon must examine the appendages. From a large experience of patients with pain due to chronic pelvic adhesions whose appendices have already been removed, I do not believe it is ever justifiable to remove a chronic appendix from a woman through the gridiron incision. This should always be done through a central incision, which allows a thorough examination to be made of the pelvic and abdominal organs.

If circumstances allow, it is better for the surgeon and gynæcologist to work together, but if this is impossible this type of case is best left to the gynæcologist, as it requires much experience to decide how to deal with the offending tube and ovary, whereas with the appendix the decision can only be between retention and removal. In making a diagnosis between these conditions, recurrent attacks of sharp pain, accompanied by sickness or a feeling of nausea and with tenderness over McBurney's point are in favour of an appendix, while a pelvic adhesion due to tubal infection more frequently gives rise to chronic aching pain, worse on exertion, to a tender mass to the side of the uterus, and

to tenderness and pain referred to a point about one inch above the centre of Poupart's ligament.

Equally common, but often more difficult to diagnose or to assess the amount of pain likely to be occasioned by the condition, is visceroptosis; sometimes the stomach and most of the viscera are prolapsed, sometimes only the colon, but this condition does give rise to much aching dragging pain and must always be carefully excluded in these cases. In doubtful cases an X-ray examination is useful.

Another troublesome intestinal condition, sometimes alone, sometimes occurring with visceroptosis, is flatulence and constipation, and this should be sought for and treated.

A prolapsed kidney is a common cause of chronic pain; usually this pain occurs in the upper abdomen, but infrequently it is situated in the iliac region. Renal calculi produce pain in the iliac regions, but this is usually acute rather than chronic.

Cholecystitis and gall-stones again may be overlooked, though very rarely if a careful examination is made, as the pain is referred to the upper abdomen. These must, however, be borne in mind and the gall-bladder carefully examined in the routine examination.

Last year a patient was referred to me with pain in the right iliac fossa. I could not find any pelvic cause for the pain and asked one of my surgical colleagues to investigate the urinary system. He found the right ureteral orifice dilated, but both kidneys were proved to be functioning well and nothing abnormal was found in the urine from either side. A few months later this patient's doctor persuaded me to readmit her to hospital as the pain still persisted. I now examined her under general anaesthesia, but could discover no cause, so again I referred her to my surgical colleague. On this occasion he found that the right kidney was a little enlarged, and further investigation showed that it was not functioning so well as before, and moreover tubercle bacilli were now found in the urine from that organ. This kidney was removed and found to be tuberculous. The interesting point is that the pain was all along referred to the right iliac region.

Having eliminated general medical and surgical conditions there are a large number of gynaecological conditions to be kept in mind when investigating a

patient with this symptom, some very common, others much rarer. To check any preconceived opinions I might hold about their relative frequency, I have analysed the notes of a consecutive series of 350 patients who consulted me for this symptom and in whom I could find a definite gynæcological lesion to account for it, and in the following discussion they are placed in the order of their frequency.

*Lax pelvic floor.*—Of all the gynæcological conditions causing chronic pain, this is the commonest. The uterus is suspended in the pelvis chiefly by the muscular tissue of the pelvic floor. In the majority of women this is strong, firm tissue, capable of performing its function no matter how great the strain to which it is subjected. In a small minority it is badly developed, and if these girls undertake heavy work, necessitating strong contraction of the abdominal muscles, the increased intra-abdominal pressure gradually stretches this weakened floor and allows the uterus to descend. This explains why prolapsus uteri in virgins is more common in the industrial north than in the south. The condition which so frequently tears and damages this floor is parturition, and so it is not surprising to find this tissue weakened after this strain.

If the pelvic floor is well developed, prolapse of the uterus can only occur when this floor is over-stretched and damaged. This damage is usually produced by parturition, and although it is more likely to follow instrumental delivery, it not infrequently occurs when the labour has terminated naturally without any tearing of the superficial structures. When this floor is damaged to any great extent the uterus will descend into the pelvis and finally appear outside the vulva. In these cases the patient herself is aware of the condition and the diagnosis is easy; but laxity of the pelvic floor not sufficient to allow the uterus to descend far into the pelvis very frequently gives rise to dull aching pain in the lower abdomen and back, pain

which is increased with exertion or long-continued standing. This is by far the commonest cause of chronic aching pain in parous women and must always be looked for when one of these patients consult us.

Fortunately it is a condition which can be cured without any mutilating operation; all that is required is a double colporrhaphy, but great care must be taken to suture the lax and torn muscles of the pelvic floor and the patient must avoid any strain upon these muscles for three months. This operation fulfils the ideals of conservative surgery; it replaces parts to their original condition, is fairly free from risk, does not entail an abdominal incision, and seldom fails. If the laxity of the pelvic floor is so slight that there is some doubt whether it is the cause of the pain, it is best to insert a rubber watch-spring pessary and allow the patient to wear it for some time. If the pain is removed or lessened when wearing it, it is proof that this laxity is the cause of the pain and a colporrhaphy can be performed; if there is no improvement some other cause must be sought.

*Matted appendages.*—This is the next common cause of chronic pain. The great majority of patients with this condition date their trouble to a confinement or miscarriage, and many know that the puerperium was not straightforward. In another group, not nearly so large as the last, the infection is gonorrhœal and in these there is a history of copious discharge commencing suddenly and accompanied or followed by pain in the lower abdomen and dysuria, although in a number of cases the infection spreads to the tubes without producing any very severe pain or general disturbance. In a still smaller group the condition is found in nulliparæ in whom there is no possibility of gonorrhœal infection, not infrequently in girls who are definitely virgins; in the majority of these the original trouble was a tuberculous peritonitis and in some of these a history can be obtained of an abdominal illness



in childhood, while in others old caseating glands are found. This condition gives rise to aching pain in the lower abdomen and back, in some cases limited to one side, in others over the whole of the lower abdomen, and this pain is worse on exertion and before menstruation. In some there is a definite tenderness in one or both iliac fossæ, especially with bimanual examination and a tender swelling can be detected to one or both sides of the uterus or in the pouch of Douglas.

Not infrequently these old damaged tubes and ovaries become reinfected by *Bacillus coli* and we see the patient with severe pain and tenderness in the lower abdomen, a raised temperature and sometimes a rapid pulse. If the trouble is limited to the right side it is often difficult to distinguish between this condition and an acute appendix.

*Cystic ovaries and ovarian cysts.*—There is a difference of opinion about the symptoms produced by cystic ovaries but I think they frequently give rise to chronic pain, and the fact that they occur so frequently in this series would seem to support this view. What I was surprised to find was the comparatively large number of simple multilocular ovarian cysts in this list, as they are not supposed to produce pain. As none of these cysts were of great size I presume that an ovarian cyst produces pain in the early stages while it is stretching and compressing some remaining ovarian tissue, and that these patients were brought to me while the remembrance of this pain was fresh in their minds.

*Uterine fibroids.*—Pain is not commonly produced by uterine fibroids though it does sometimes occur in a fibroid which is rapidly enlarging or undergoing certain types of degeneration. More frequently, when a uterine fibroid is found in a patient suffering from chronic pain, there is some slight laxity of the pelvic floor and the weight of the tumour is sufficient to stretch the floor and so produce the pain. Occasionally a fibroid develops in the pelvis, or drops into it

after the menopause and by its pressure alone produces some aching pain. The diagnosis is easy—the presence of a solid tumour attached to the cervix, and the treatment necessitates the removal of the tumour.

*Carcinoma of the cervix.*—The fact that this condition appears next upon my list is a sad commentary upon the late stage at which these patients appear for consultation. Pain in carcinoma of the cervix is a late symptom and I do not think that any patient with this symptom can be cured. Here again the diagnosis is easy, irregular hæmorrhage with some friability of the cervix, and the treatment is either a Wertheim's hysterectomy or radium.

*Chronic cervicitis.*—The cervix is relatively insensitive and many authors are doubtful whether any condition of the cervix itself can produce pain. It may be that these cases of chronic cervicitis which produce pain do so by distension of the deeper portion of the glands and that these compress structures adjacent to the cervix, but there is no doubt that cure of this condition, whether by local application of drugs, cauterization or amputation, does remove this pain. The pain produced by chronic cervicitis is usually referred to the sacral region, but some of these cases complain also of pain in the lower abdomen. The diagnosis of chronic cervicitis depends upon the history of the chronic pain being accompanied by a vaginal discharge, usually containing thick glary material, dating from a confinement or from an acute onset of the discharge. The cervix is thickened, often lacerated, and contains ovula nabothii.

*Malignant disease of the ovary.*—This is a much less common disease than those mentioned above and so the fact that it comes next in the list shows that chronic or recurring pain must be a frequent symptom. This symptom does not depend upon extension of the growth to other structures, as it was present in patients in whom the malignant ovaries were comparatively small

and quite free from adhesions. In future, I shall pay more attention to this symptom in a patient with doubtful pelvic findings. The diagnosis of this condition depends upon the presence of a solid mass in the pelvis or lower abdomen with free ascites, and in the earlier stages often presents great difficulty.

*Endometrioma.*—In this condition, endometrial cells, cast off during menstruation, pass along the Fallopian tubes to the peritoneal cavity and grow upon any structure upon which they alight. Most commonly this is the ovary and by the growth of the endometrial tissue this is intimately bound down to adjacent structures, e.g. rectum, uterus, broad ligaments; these endometrial cells grow and produce small islands of endometrial tissue with glands and intra-glandular tissue indistinguishable from the endometrium itself. In time these glands acquire the menstrual function, and as they are blind this blood cannot drain away; in this way each gland forms a small blood cyst which enlarges each month as more blood is menstruated into it and so gives rise to acute pain during menstruation, followed by dull aching pain. Dysmenorrhœa of late onset with an indefinite tender swelling behind and to one side of the uterus are the most characteristic points in the diagnosis.

*Chronic cystitis.*—This more commonly gives rise to frequent and painful micturition with acute pain in the hypogastrium and in the vagina. In a small percentage of patients with a very chronic cystitis this symptom of aching pain in the lower abdomen is complained of and so it must be borne in mind when investigating a case with this symptom. The diagnosis depends upon the presence of pus and organisms in the urine.

*Prolapsed ovary.*—This, as would be expected, is often the cause of chronic pain, though it is more frequently referred to the back than the lower abdomen. Occasionally the meso-ovarian ligament is stretched so far that the ovary is prolapsed into the pouch of

Douglas even with a uterus in good position, but much more frequently the uterus is retroflexed. This position of the uterus not only increases the possibility of prolapse of the ovary, but aggravates the chronic pain owing to the weight of the uterus being continuously applied to the ovary. Dyspareunia is a common accompanying symptom and the diagnosis is easy as the tender ovary can be felt in the pouch of Douglas.

*Retroflexion of the uterus.*—The symptoms produced by this condition formed at one time one of the most vexed questions in gynæcology. Retroflexion was a comparatively easy condition to diagnose, and, as the early teaching was that any position of the uterus other than that of anteflexion and anteversion was abnormal, it naturally followed that any symptoms complained of by a woman with a retroflexed uterus must be caused by that retroflexion. Unfortunately, this condition was not only easy to diagnose but, in the great majority of cases, easy to treat and so it came about that, in one period in gynæcology, these unfortunate patients were condemned to wear pessaries and a gynæcologist could hardly consider himself fully established until he had attached his name to some modified type of this instrument; at a later period they were condemned to submit to some operation which fixed this unfortunate organ forward and offered the same facilities for modification and nomenclature.

Later came the reaction to this teaching, led by Donald, of Manchester, who taught that a mobile retroflexion was not the cause of symptoms and that if any were present they were produced by some concurrent conditions. This teaching is now generally accepted and although we must recognize that in a few cases a retroflexed heavy uterus does produce chronic pain and so call for treatment, these cases are rare; in the great majority the retroflexion is accompanied by some other condition which is really the cause of the pain—lax pelvic floor, prolapsed ovaries, endome-

tritis, etc. These remarks apply only to mobile retroflexion; a uterus fixed by adhesions will cause discomfort, not from the position of the uterus, but from the fixation. The effect of this old dogmatic teaching has not yet died out and a large number of patients with chronic pain in the back and lower abdomen are still condemned to a fixation operation, and many are sent to us labelled with this diagnosis and with a request to rectify it.

The modern teaching—and I believe the correct one—is that a mobile retroflexion seldom causes symptoms and that some other cause must be sought, but that, in a few cases, this position does give rise to symptoms and so, if no accompanying condition can be found, a fixation operation may be beneficial. In such cases the uterus should be replaced and held in position by a pessary and an operation subsequently performed only if the patient's symptoms are relieved by this treatment.

*Chronic endometritis.*—This is another controversial subject. If a uterus is of normal size or only slightly enlarged and the patient suffers from menorrhagia, dysmenorrhœa or chronic aching pain, for which no other cause can be found, a thorough curettage will often effect a cure. If each case is carefully investigated only a small number will be left in this category. Many gynæcologists disbelieve that the endometrium is the cause of the trouble, but so long as these cases are cured by curettage it seems reasonable to assume that the endometrium is at fault. Although no one now believes that the endometrium is inflamed, it causes less confusion to retain the old name of endometritis rather than coin a new one which may have to be changed in a few years' time when our knowledge of endometrial pathology is further increased.

*Subinvolution.*—This causes chronic pain only because the weight of the uterus is increased. It is frequently found in patients who complain of chronic aching pain,

as this condition can only occur after parturition and so is often found in association with slight laxity of the pelvic floor. A uterus, a little enlarged, regular in outline, in a parous woman, is usually due to subinvolution.

*Varicocele of the broad ligaments.*—This is an interesting condition, to which Fothergill called attention in 1915.<sup>1</sup> He pointed out that this was a common cause of aching pain in one or both sides of the lower abdomen in women and that it frequently occurred in virgins and nulliparæ. The diagnosis, he states, can only be made by the exclusion of other causes of pain as it is not possible to feel the bunches of dilated veins during bimanual examination. It is very difficult to prove the presence of a condition which gives rise to no physical signs and, like many other gynæcologists, I was somewhat sceptical until in 1922 I had, in a period of seven months, three patients with such large swellings to one side of the uterus that I opened the abdomen with the diagnosis of “matted appendages” and in each case found a large mass of dilated veins in one broad ligament with normal ovaries and tubes. In each case I ligatured and excised the bunch of veins, but the subsequent history in each case was unsatisfactory and I had eventually to do a second abdominal section for each of them.

To have three such marked cases in such a short period proves that the condition does occur and in all probability Fothergill was right in stating that this condition occurs frequently in a minor degree, sufficiently marked to produce aching pain but not sufficient to give rise to physical signs. If a patient complains of chronic pain in the lower abdomen, relieved with rest and without physical signs or history pointing to any other condition, the pain is probably due to varicose veins in the broad ligament. The treatment is not satisfactory; rest is beneficial but is a treatment we must use with discretion in young patients;

tampons are often beneficial if applied high in the fornix and sufficiently large to support the broad ligament. Excision of the veins in marked cases may be necessary or even a hysterectomy.

*Polypus.*—The expulsion of a fibroid polypus usually gives rise to acute pain, but occasionally the dilatation is much more gradual and so does not provoke severe contraction of the uterus. In these cases the patient may suffer from chronic aching pain in the lower abdomen. Quite recently I had such a patient in the Infirmary who had complained of chronic pain in the lower abdomen for two years; a small fibroid polypus was found at the external os and the pain disappeared after its removal. The diagnosis in these cases is easy, as the patient only suffers from pain when the cervix dilates and the polypus can then be felt.

*Neurosis.*—To make this diagnosis is usually a confession of failure. Many highly-strung women complain of pain out of all proportion to the lesion which produces the pain, but it is wrong to label these as neurotics for whom nothing can be done. Careful investigation will usually find a cause, however small, and very frequently removal of this cause cures the pain. We have, however, in these cases to be especially careful that we have found the cause and the only one and, if operation is the treatment suggested, to be determined that one operation only will be performed.

*Carcinoma of the body of the uterus.*—This is supposed to produce pain at an earlier stage than carcinoma of the cervix. It would be accompanied by some hæmorrhage, often very slight, in a woman past the menopause. Any case with this symptom must be thoroughly investigated and this usually includes a diagnostic curettage.

*Endocrine deficiency.*—The pain due to this condition is usually most marked in the pre-menstrual period and is frequently accompanied by scanty and infrequent menstruation. In some of these cases the aching pain

continues between the menstrual periods, but it usually increases in severity as the period approaches and is relieved when the menstrual flow is well established.

*Adenomyoma of uterine wall.*—This is a rare condition. It causes some regular enlargement of the uterine wall and, in a parous woman, is indistinguishable from subinvolution. The diagnosis is usually made in the laboratory.

*Marital hyperæmia.*—This is frequently accused of producing chronic pain in young married women, but I doubt if it does so except in very rare cases. Careful search will generally find some other condition present, though the symptom from this may be exaggerated by marital excess.

*Conclusions.*—Such a large list of conditions producing this one symptom may appear to be confusing, but it is really not so and, with due care, a definite diagnosis can usually be made. The majority of these conditions present definite physical signs which make the diagnosis easy. In the others great care must be exercised, and as so many of these conditions can be treated by surgical means, a special word of warning must be uttered against performing any operation unless a definite diagnosis is first made.

Even with the greatest care mistakes will be made and, if we have to operate a second time, the element of neurosis is much increased, for these patients very readily develop an operation habit and never seem happy unless they are contemplating or recovering from an operation. Let me give the short history of one case, a somewhat exaggerated one and not common in such a marked form, but by no means an isolated one :—

This patient was a young unmarried woman in the middle twenties who had suffered from chronic pain in the lower abdomen for some years when she fell into the hands of a practitioner with a surgical instinct. In the first place he removed her appendix; as she was not any better, six months later he again opened the abdomen and removed the right ovary; still there was no improvement, so in another six months another abdominal section and ventral fixation of the uterus was performed; still no improvement, so the uterus



was now curetted. I saw the patient at this stage and found the right kidney prolapsed almost into the iliac fossa and I suggested a kidney belt as the patient had had so many operations. A year later the patient again consulted me and told me that her doctor did not believe in belts so he had insisted upon fixing up the kidney a fortnight after she had seen me. I found the kidney was fixed, but in the iliac region, not where one would expect it and moreover there was a urinary fistula in the scar. When I saw her for the third time a year later the kidney had been removed and still the patient complained of chronic aching pain in the right lower abdomen.

This is an exceptional case but illustrates what may happen if very great care is not taken over the diagnosis. With such a symptom, produced by so many lesions and frequently exaggerated by the mental condition of the patient, we all make mistakes and I fear will continue to do so. All we can hope for is to reduce them to the minimum and we can only do this by bearing in mind the many conditions which produce this symptom when we investigate each case.

#### Reference

<sup>1</sup>Fothergill, W. E. : "Varicocele in the Female," *Clin. Journ.*, 1915, xliv, 111.

# The Diagnosis of Acute Appendicitis

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AN analysis of 70 cases of acute appendicitis, 35 being from the records of consecutive private cases and 35 from consecutive hospital cases, showed that in each group there were 19 which required drainage of the peritoneal cavity; in other words, 53 per cent. of cases in both groups had pus in the peritoneal cavity before coming to operation, as the following table shows:—

	Private Cases.	Hospital Cases.
Cases of acute appendicitis - - - -	35	35
(1) <i>With pus formation:</i>		
(a) Abscess present—		
appendicectomy performed - -	14	15
(b) Abscess present—		
abscess only opened, - - -	1	1
appendicectomy not performed.		
(c) With general peritonitis - -	2	2
(d) With spreading peritonitis - -	2	1
(2) <i>Without pus formation:</i> - - -	16	16

This table shows clearly that cases of acute appendicitis still come under observation relatively late; usually this is because the family has made a determined onslaught on the disease before seeking expert advice. This misplaced purgative treatment usually intensifies its severity. Unfortunately, however, some medical men still feel justified in watching appendicitis in its early stages, diagnosing colic or gastritis. Gastritis is such a rare disease that it should be the last refuge of the diagnostician.

Every colic should be looked upon with grave suspicion; colic or pain traversing the abdomen from side to side or in the region of the umbilicus demands especially careful consideration. Only too often this is

the first sign of appendicitis, and what on one day may appear to be a simple colic arising from some indiscretion in feeding or drinking, may next morning prove a serious suppurative lesion inside the abdominal cavity. It would be an interesting study to analyse the histories of intestinal colic in childhood so as to determine how many of them went on to definite appendicitis; I think few only, but the association is there in some cases and its significance must be recognized. Otherwise one may be lulled by the repeated attacks with recovery into a sense of security, only to awaken one day to a colic which has changed to appendicitis. Such a case is the following :—

A child, aged  $5\frac{1}{2}$ , was brought for attacks of colic which dated from infancy. The whole picture was too indefinite to justify operation, and watching was advised. Three and a half years later she had one of her previous attacks of colic; no rigidity, normal temperature and pulse, relief by pressing on the abdomen. Next day, fever, rapid pulse, relative resistance of the right rectus muscle, and at operation a pronouncedly diseased appendix.

Again there is another type of clinical history which precedes the definite attack of appendicitis, but is more commonly associated with a chronic type of disease. In these cases there is a history of repeated bilious attacks, the patient vomiting freely for a few hours without any pain and then recovering. But one day the bilious attack is associated with pain, and from this time on the history is one of recurrent appendicitis, and possibly later, owing to anatomical peculiarities or retention of products, a fulminating attack. I do not want to exaggerate the picture, and these preceding histories of colic or bilious attacks are exceptional, but now and again they occur and are worth remembering.

Cases of abdominal pain should provisionally be regarded as appendicitis. A parallel may be drawn with tonsillar lesions; as cases of diffuse folliculitis of the tonsil with free secretion may closely simulate diphtheria they should be regarded as potentially

diphtheria until they are proved not to be. In the same way cases with intestinal colic passing from one side of the abdomen to the other, usually at the level of the umbilicus, should be labelled appendicitis, even if such suspicions are not communicated to the friends, until it can be determined by the subsequent course of the disease that any such fear can be disregarded. Purgatives should be strongly condemned, for they are of questionable value in simple colic and fraught with the greatest danger in appendicitis. Rest, local warmth and starvation will usually afford relief to pain. I would again emphasize the characters of this onset of appendicitis, the occurrence of a pain in the region of the umbilicus or a little above or below and on both sides of the middle line sometimes running right across from one side to the other. It is a colicky pain like stomach-ache.

Acute appendicitis very seldom begins as a pain in the right iliac fossa or at McBurney's point. This history of a diffuse central abdominal pain which later settles down to distinct localization in the right iliac fossa in the neighbourhood of a spot half-way between the umbilicus and the anterior superior spine is the characteristic and outstanding feature in the diagnosis of acute appendicitis. In this early stage of para-umbilical pain fever is usually absent and the abdomen moves well with respiration. Diagnosis is uncertain, so watching is important. Temperature and pulse records should be taken at intervals. Unfortunately, this is the stage of domestic treatment, when the family panacea, castor oil, is advised by a relative or friend. If a purgative of any sort has been given—and inquiry should always be made on the point—then careful watching becomes doubly important, for a rapid increase in the inflammation must be expected, and in a very few hours the patient may pass from a mild clinical condition to one of extreme gravity. This pain passing from one side to the other—and the patient

can practically always say that it is a bilateral pain, even when it is almost localized to the umbilicus—is an important point in the differential diagnosis. It practically eliminates unilateral renal and ovarian lesions; its colicky nature and transverse character are against pyelo-nephritis. If, as is usual, this transverse pain is para-umbilical it is against cholecystitis; but if epigastric the diagnosis may be very difficult. In some cases of cholecystitis without jaundice the pain starts in a manner like that of the transverse pain of appendicitis, but it is somewhat higher and is followed by rigidity of the right rectus, pronounced throughout its length. The maximum tenderness may be below the umbilical level; owing to the close anatomical relationship of the gall-bladder and the appendix this is not surprising. Unfortunately, with unilateral pelvic disease this onset and, in fact, subsequent localization of pain make the differential diagnosis more difficult. On the whole the less acute onset, the absence of vomiting and the usually trifling character of pyrexia should make the appendicular origin doubtful. Once doubts have been raised, a more thorough and systematic examination, physical and bacteriological (microscopic films), settles the problem.

I have seen two cases only of spinal disease mistaken for appendicitis. In both, the physical examination was the misleading factor. They both had severe rigidity and tenderness in the right iliac fossa, but in neither case was there fever or vomiting; the rigidity was such that the impression of a peritonitis so severe as to lead to tumour formation was present, and yet in both cases, under the anæsthetic, the iliac fossa went soft and free from thickening of any kind. In both these cases the muscular rigidity was entirely one-sided.

The close anatomical relation of the duodenum, the appendix, and especially of a retrocæcal appendix, which may travel as far as the under-surface of the liver, explains why the inflammatory lesions of the

two structures may resemble each other. It is not the perforation of an ulcer into the general peritoneal cavity which causes the difficulty, but the local perforation. In most cases the differential diagnosis is simple, for the perforated duodenal ulcer has the picture of a supra-umbilical rigidity, and in the early stages absence of fever and a rather slow, shocked pulse. The history of a transverse pain centreing about the umbilicus is absent. The following case is so instructive and emphasizes these difficulties of diagnosis so well that it may be quoted.

A man, 42 years of age, was admitted into a nursing home about 1.30 a.m. with a history that he had suffered from duodenal ulcer with melæna three years previously, for which he received medical treatment with relief. The present attack began at 5.30 p.m. soon after his tea and about eight hours before he was seen by a doctor. Pain and vomiting dominated the picture; the pain began as a stomach ache around the umbilicus. On examination the abdomen moved with respiration. He pointed to the right iliac fossa as the present site of his pain where there was resistance on palpation. The liver dullness was present and there was not any fever. A diagnosis of acute appendicitis was made despite the absence of fever, and operation decided upon. There was a period of waiting whilst an anæsthetist was found and during this time I remained with the patient and was struck by the severity of his pain. He writhed, cried out and sweated. This was not due to lack of fortitude, but was a measure of the severity of his pain; so striking was this that I came to the conclusion that an ulcer must have perforated. The absence of fever and the previous history of duodenal ulcer supported this view, and accordingly the abdomen was opened in the middle line. The first diagnosis, however, was right; no lesion of the stomach or duodenum was found but there was a distended appendix, a typical obstructive appendicitis. The history of duodenal ulcer associated with melæna, the severity of the pain and the absence of fever suggested a perforation of a duodenal ulcer. On the other hand the definite localization to the right iliac fossa with the history, given by the patient, of the onset as a para-umbilical pain supported a diagnosis of appendicitis.

These cases of obstructive appendicitis are often characterized by the severity of the pain, as might be expected, and by the absence of fever until necrosis sets in, and a case like this shows, I think, how difficult the diagnosis may prove.

Now let us pass from the diffuse para-umbilical pain

of early onset to the more localized one. The diagnosis of appendicitis is seldom made until the pain has settled down in the right iliac fossa. When it does so there is usually with it a rise of temperature and a corresponding increase in pulse-rate. At this stage, whether or not vomiting has occurred, a positive diagnosis should be made and operation advised and even urged. To put it in a nutshell, a pain which starts diffusely across the abdomen, settles in the right iliac fossa, and is associated with rise of temperature, is due in the great majority of cases to inflammation of the appendix. The risk of leaving such a case is so great that if now and then it is due to other causes, usually surgical, no medical man can possibly blame himself for insisting on operation, when he so well knows the risk run by delay. I am more and more convinced that this is the right way to look at the matter.

The pain elicited by pressure on the abdominal wall, with the resultant resistance or rigidity of the right rectus muscle, is dependent on an inflamed appendix beneath, and the objection to having pressure direct or indirect applied to it. On the other hand, the localization of pain by the patient is dependent on a transmission from the inflamed or stretched structure through the sympathetic to the cord and thence through the spinal sensory nerves to a portion of the parietes. Now the nerve supply of the appendix is, on the whole, constant, so also is its co-ordination with the nervous system. The locality of the referred pain to the patient is the same therefore whether the appendix be just beneath the right rectus, retrocaecal or pelvic. This is not so, however, for the pain elicited by the surgeon's manipulations. If the appendix is under the rectus, so that the hand pressing down will directly or indirectly (through intervening or neighbouring coils) press upon this inflamed appendix, then the rectus will go into contraction to protect it, and the surgeon feels the resistance or rigidity and draws his

own conclusion. But if the appendix is not so situated, if it be retrocæcal or well behind the mesentery or in the pelvis, then in the early stage, before the inflammation has become diffused, such palpation, not interfering or exerting pressure, causes no reflex protecting contraction, and the examiner finds no resistance or rigidity and is likely to be lulled into a false security. It is for this reason that so much emphasis is laid on a pelvic examination in a case of doubtful appendicitis, and in addition a palpation of the retrocæcal region, by pressing in above the crest of the ilium in the lumbar region, which may bring to light a tender and painful area. Let me emphasize these "blind" areas by a case :—

A young fellow, aged about 20, was vomiting freely and complaining of abdominal pain. There was no fever, the abdomen moved freely and could be freely palpated from the front. On palpating in the lumbar region the muscle was at once thrown into contraction and he winced with pain. It was possible to warn the doctor that he had a diseased appendix which was retrocæcal in position, but also that as he had this severe vomiting without fever it was probable that the case was one of obstructive appendicitis and that operation was urgently called for. Both these forecasts proved true.

It must be remembered here that it is in the early stages of the disease before it has passed outside the appendix, that in the retrocæcal and pelvic cases, palpation of the abdomen may fail to elicit pain, and movement of the abdomen be perfect. When the disease has spread outside the appendix to the neighbouring peritoneum any palpation in its neighbourhood will be painful and the forward spread from the retrocæcal locality or the upward spread from the pelvis will produce inflammatory changes in the right iliac fossa which are manifested by limitation of movement of the abdominal wall and tenderness on pressure. Analysis of cases of retrocæcal or pelvic appendicitis will show how seldom the right iliac fossa is painless. This is because [the disease has already spread; it bears out the statistics given above as to advanced disease and



*Bacillus coli* peritoneal infection. An interesting case which occurred many years ago shows the difficulties arising in diagnosis :—

A boy, aged 14 years, was taken ill with what was thought to be a bilious attack on the 12th of the month. There was no fever. He was given medicine and the bowels acted. On the 13th, at 10 p.m. his temperature was 102° F. and pulse 120. There was no vomiting, the abdomen could be pressed upon from the front until the posterior wall was reached without resistance or complaint of pain, and rectal examination was negative. The diagnosis was uncertain, but he was sent into a nursing home for observation. Next morning at 10 a.m. his temperature was below normal, pulse-rate 84, when seen by his practitioner and as there was not any vomiting nothing further was done. Nearly 48 hours after my first visit there was relative rigidity compared with the other side and definite tenderness on pressure in the loin. With this history a diagnosis of retrocaecal appendix was made, and at the operation a local collection of pus round a retrocaecal appendix was found.

This was a good example of appendicitis in what may be called a "blind" area. The absence of resistance in the right iliac fossa and of vomiting rendered the picture doubtful. What ought to have made one very anxious and justified immediate exploration was the rise of temperature and pulse following a purgative. The second day when the stimulating effect of the purgative had gone and absolute rest and rigid diet had produced a period of quiescence the official visit coincided with a subnormal temperature and a quiet pulse. I have seen this apparent normal temperature quiescence create a sense of satisfaction and ease of mind in the medical man which has lulled his anxieties to rest for a time. One of the lessons to be learned from a case such as this is the importance of temperature and pulse records and their comparison at intervals of at least twelve hours. Reference to vomiting and its significance will be made later. The laxity of the abdominal wall and its free movement with normal breathing when the appendix was undergoing serious changes are well illustrated by this case.

Before leaving the consideration of pain, mention should be made of painful micturition. It is of importance in relation to differential diagnosis. In the

acute phase of pyelo-nephritis a cystitis is common and is associated with painful micturition. In a pelvic appendicitis, and especially if associated with a local peritonitis, contraction of the bladder may be painful. It may be the outstanding feature of the case when the appendix is inside the true pelvis, in contact with any distension of the bladder. The painful micturition of a cystitis from whatever cause comes at the end of micturition, when the inflamed internal surfaces come together, but in the painful micturition associated with a pelvic appendicitis the pain is often at the beginning, so that a history may be given that the patient holds water as long as possible because of the pain caused when the act is started. This pain is probably due to pressure transmitted to an inflamed appendix lying in contact with the bladder. When this is distended, the pressure of the contraction of the abdominal muscles, as occurs at the onset of micturition, must be appreciable in such an unyielding area as the pelvis. Painful sensation will thus be produced at the beginning of the act. In some cases the inflamed appendix is adherent to the bladder and pain will occur during the whole time of the bladder emptying.

Vomiting must be looked upon as one of the cardinal signs in appendicitis. It is fairly constant. Analysing 50 cases of acute appendicitis I found that vomiting occurred in 36, nausea without vomiting in 6 cases and no vomiting and no nausea in 8 cases. Nausea may be taken as equivalent to vomiting as a clinical factor so that what may be called the positive evidence is present in 84 per cent. of cases. Its significance will thus be realized. From examination of numerous case-histories I should say that vomiting occurs in the early stages of the disease in the majority of cases, the usual history being that the attack was ushered in with pain and vomiting. Also it is well to remember that after this early onset of vomiting there may be no more until some complication, such as peritonitis or

obstruction sets in. This point should be emphasized because it is not uncommon to be told that vomiting has ceased, with the implication that any serious view of the condition may be put aside. On the other hand vomiting may set in late or it may persist throughout the illness. It may only be absent owing to a careful avoidance of any food or drink and in the absence of vomiting it is well to inquire on this point. A refusal of food because of a fear of vomiting is equivalent to nausea and should be looked upon as positive evidence.

The outstanding signs of acute appendicitis are abdominal pain, fever and vomiting. Absence of vomiting does not negative the diagnosis if other cardinal signs and symptoms are present, it calls for consideration and a review of other possible diagnoses, especially simple colic or renal, gall-bladder and pelvic lesions.

Fever, the third symptom, can be quickly dealt with. Its degree is of small moment. High fever may be present with a mild catarrh and slight fever, 99°-100°F., may be associated with gangrene. In the presence of abdominal pain, with the characters I have referred to, the occurrence of fever eliminates a colic and appendicitis should dominate the medical man's view, for some gross pathological change is almost certainly taking place in the abdomen.

Any one sign or symptom may be absent; it is possible that two may be absent; but from a long experience of the disease, I am sure that the clinical picture can be recognized in the vast majority of cases by consideration of a detailed history and a careful clinical examination. I would stress the importance of the onset with pain across the abdomen, a "stomach-ache" pain, not limited to one side.

# Types of Acute Appendicitis

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APPENDICITIS easily outnumbers other conditions for which general surgeons operate, and a review of its characteristics is well merited from time to time. The etiological factors are still indefinite—no one cause or organism being specifically concerned. It is a somewhat recently recognized disease, first becoming prominent in 1895, since when it has been of consistently frequent occurrence. Its rise has been most marked in the cities and amongst the “better off” classes, whilst institutional inmates on plain diets are relatively immune. It is common in highly industrial and civilized countries, whilst in rural nations and native tribes living under native conditions it is still rare, but, if they take to “civilized” food, it becomes common. Similarly, in wild animals it is unknown, whilst amongst the captive animals at the Zoo it is not infrequent. Generalities point to its being undoubtedly a disease of civilization, with its adequate supply of pure rich food of all descriptions. Sherren showed years ago, that it occurred in seasonal waves, especially two to three months after influenzal epidemics. It may occur at any age; it is rare in the aged, and most common in the second, third and fourth decades.

The exciting cause is elusive; occasionally thread worms, concretions, bristles and kinks are found in the appendix, but it is not usually possible to say what precipitated the attack. Quite frequently it occurs ten to fourteen days after tonsillitis and also after a large dose of purgative. The *Bacillus coli*, staphylo-

coccus, streptococcus, *B. Welchii*, tubercle bacillus and actinomycotic fungus have all been isolated from acute cases, occasionally in pure cultures, but usually the infection is mixed.

*Pathology and Types.*—*Acute catarrhal appendicitis*, in which the inflammation is chiefly in the mucous membrane, which is swollen and congested with patchily distributed petechial hæmorrhages, and the organ is tense with blood-stained mucus. The muscular and peritoneal coats are at first unaffected, but later become reddened and swollen. The tip is often club-shaped, and distension is general or localized to the distal half or lower third. Occasionally, in severe infections, the appendicular vessels become thrombosed, then massive gangrene follows, and this is manifested clinically by a feeling of well-being, a fall to normal temperature (there being no circulation to carry the toxins away from the dead appendix) and pain is easier. This condition is well termed a “stage of delusion” and is only a temporary lull before a peritoneal storm of possibly fatal intensity. Resolution may be complete, no sign of the attack remaining, but usually some change remains in the shape of a fibrous stricture or an adhesion giving rise to a kink or twist, thus preparing future trouble, grading from the so-called chronic appendicitis to an acute fulminating attack.

A further development of this catarrhal condition may arise; if the lumen becomes blocked by the congested mucous membrane or by the swelling around a piece of fæcal matter or a stricture, acute appendicular obstruction is superimposed and, according to the contents of the appendix (*vide* p. 150), a mucocoele, an empyema or gangrene will ensue, unless the obstruction is overcome or the appendix removed by early operation. Seventeen years ago, D. P. D. Wilkie described acute appendicular obstruction; this is an important, definite, clinical entity, beginning differently from, but ending in, acute

appendicitis. It is, at first, a mechanical obstruction of the lumen and not an infection in the walls. It is predisposed by: (a) Fibrous strictures of previous attacks, which become plugged by inspissated fæces or the ingress of intestinal contents, often after taking purgatives, a heavy meal or due to direct trauma or muscular straining. I have several times removed an acute appendix with a definite recent history of a blow over it. (b) Kinking or twisting of the appendix by bands or adhesions, again frequently the remnants of a former inflammation. Wilkie states: "In my experience, however, it has more commonly been a congenital fold attached about the middle of the appendix, fixing this part down toward the pelvis; this fold is almost certainly the genito-mesenteric fold described by Douglas Reid." Most surgeons are familiar with this fold and know the difficulties it occasions in appendicectomy.

It will be readily realized how these factors impede the passage of fæcal matter in and out of the distal part of the appendix, and that once in, it is likely to remain, and become hard, when it will give rise to transient attacks of colicky pain until it grows large enough, by added layers, to precipitate a frank obstruction, when the appendix becomes distended with mucus and rapidly infected—usually by *B. coli* forming a living culture tube.

Wilkie's work on a dog's intestine shows what happens in such an obstructed appendix. In a dog, he isolated a loop of ileum and closed its ends, then reconstituted the lumen of the gut by end-to-end anastomosis. He found that: (a) When a loop was empty, it slowly filled with mucus, forming a mucocele and health continued undisturbed; (b) when it contained fæcal debris after a carbohydrate diet, in several days it gradually distended with pus, forming an empyema; (c) when full of fæcal debris after a rich protein diet, it rapidly became gangrenous and

the animal died in 24 hours, of acute toxæmia.

A parallel can thus be drawn from this work and the sequence of events occurring in the above obstructed appendix, estimated. An obstructed empty appendix will develop a mucocele, an obstructed appendix containing carbohydrate fæces will form an empyema, and when filled with protein residue, massive gangrene and general, probably fatal, peritonitis with severe toxæmia will take place. Recently, on opening an obstructed appendix (after removal) with the point of a scalpel its contents were under such tension as to splash five feet up the theatre wall, illustrating dramatically the catastrophe which would have been precipitated in the abdomen, had rupture taken place before or during operation.

Wilkie's work is most valuable and illuminating, and besides explaining the rationale of the changes in the appendix establishes an etiological factor regarding the effect of diet. It stresses the danger of the present-day tendency to excessive intake of meat and carbohydrate, which have only been possible during the last forty years with the advent of refrigerating ships for fruit and meat carrying and cheap beet sugar. Urgent gangrenous appendicitis is only seen amongst meat-eating people and is twice as common in the male as the female, this probably because the average man has a richer protein diet and is more liable to trauma.

*Acute suppurative or ulcerative appendicitis* usually begins in an erosion of the mucous membrane opposite to a piece of hard fæces, when the inflammation rapidly spreads to the musculature and peritoneal coats, early initiating a perforation into the peritoneal cavity by a patch of gangrene forming at the site. The course of the suppurative and gangrenous conditions is determined by: (1) the reaction of the peritoneum, adhesions may localize the mischief, especially if the appendix is retrocæcal or in the

pelvis, leading to abscess formation. (2) By the severity of the infection, a fulminating fatal peritonitis may ensue from a streptococcal infection, and the appendix appearing not grossly inflamed. *B. coli* give a characteristic faecal odour and when smell is absent, except in the very early cases, advise a guarded prognosis, suspecting the presence of the deadly streptococcus.

During the last three years, I have operated on 350 acute appendices: of these 127 were gangrenous or purulent, but unperforated, 70 had perforated and 93 were catarrhally inflamed, one of the last group, in a young woman aged 21, also showed a carcinoid growth of the appendix, emphasizing the value of a routine opening and careful inspection of the mucous membranes, all types of interesting items occurring.

*The clinical picture.*—Acute appendicitis is initiated by general abdominal pain or discomfort centred round the umbilicus, better described by the patient as stomach-ache and is usually of gradual onset in appendicitis proper and associated with general malaise. This general pain is sometimes so slight as to be scarcely noticed by the patient unless cross-examined or may be very severe; they will frequently admit of a stomach-ache but not abdominal pain. I regard it as the essential preliminary to every attack of appendicitis. I have not seen a "true bill" without it—it ushers in primary and recurring attacks.

Nausea, retching or vomiting succeed or accompany abdominal pain and vary in their intensity. Patients usually vomit once or twice only; if repeated appendicular obstruction should be suspected or investigation made for another lesion. There may only be distaste for ordinary food, the patients only taking a glass of milk at their chief meal time.

The pulse and temperature are raised, the latter usually 99–100° F.; if it is higher than 101° F. (except in a child) carefully examine for a cause elsewhere



before diagnosing appendicitis, for example, pleurisy, influenza or pyelitis; in these, rigors usually occur, but seldom in appendicitis.

The pain, varying in character and place, may pass over to the left side, but ultimately settles down in the right iliac fossa, sometimes a little higher or lower, or through to the back according to the position of the appendix. In pelvic appendicitis, it usually remains lower abdominal and does not settle definitely in the right iliac fossa. This may be the case in appendicitis occurring in the latter half of pregnancy, when the uterus lifts the anterior abdominal wall clear of the inflamed organ and thus tends to mask the localizing signs until an advanced condition is present.

Headaches and pains in the back and limbs are usually absent, a referred pain in the testicle, along the same tenth dorsal nerve segment as the appendix, sometimes occurs; this suggests a renal lesion and emphasizes the necessity for microscopic examination of urine in all cases. A sudden cessation of pain and a feeling of well-being or marked improvement suggests gangrene or perforation with the relief of tension; this is often precipitated by the homely but dangerous doses of castor oil which cannot too heartily be condemned. The temperature and pulse temporarily approach normal and patients often get up, saying they are better.

Pain made worse on walking, or extension of the thigh, or causing a limp or sensation of weakness in the thigh suggests an appendix lying on the psoas; if it is lying on the bladder, it may give rise to frequent or painful micturition. A retrocæcal appendix may be close to the gall-bladder and so mimic acute cholecystitis. The bowels are usually constipated, but occasionally in pelvic appendices, diarrhoea occurs, probably from irritation of the pelvic colon. After an enema, if there is little or no result, perhaps only flatus passed, taken with the rest of the picture, this

is a positive sign; it indicates a reflex inhibition of bowel activity caused by the presence of inflammation in the lower abdomen.

The above history is constant in all true cases of appendicitis; it may be only elicited with difficulty, but it is present with modifications according to the infection, type of patient and position of the appendix.

Acute appendicular obstruction shows a different clinical picture. It is characterized by the sudden onset of severe, colicky, general abdominal pains, in spasms, sometimes doubling up its victims and causing them to roll about. It occasionally awakens patients asleep in bed. I have known two such cases sent to hospital as perforations. The restlessness is of diagnostic significance; it indicates a mechanical pain, whereas inflammatory pain usually immobilizes its victims, as inflammation supervenes, the patients gradually lie quiet and still in a position of greatest ease. The temperature and pulse are little disturbed at first; this encourages waiting and the diagnostic label of indigestion or intestinal colic (which it really is) especially if there has been any suspicion of dietetic indiscretion.

The absence of a raised temperature is baffling, and as much note is taken of this figure, perhaps too much so, it is essential to use a first-class tested instrument. Repeatedly, after seeing a patient, when the clinical picture has not agreed with the reported temperature (e.g. it has been stated to be normal when the symptoms and signs suggested it should be raised and vice versa), I have checked it by a tested thermometer I carry and have, many times, found it incorrect. The thick, cheap "two-minuter" as commonly used, especially in hospitals, is not trustworthy; it often takes longer than this to record and is difficult to completely shake down and read.

Retching and vomiting are repeated, whereas it is unusual for a patient with true appendicitis to do so

more than once or twice. The symptoms are purely abdominal at first, there being no signs of inflammation or systemic toxæmia, although the face is usually anxious. Often, careful inquiry will elicit a history of attacks of colicky pains, worse on the right side of the abdomen.

The picture of acute appendicitis with obstruction occurring afterwards is not so clear. The symptoms begin with those of acute appendicitis and, as obstruction occurs, the pain becomes severe, spasmodic, colicky and vomiting repeated. Perforation rapidly supervenes with the occasional "period of delusion," but a rising pulse-rate with general abdominal pain and increasing abdominal tension, indicate the onset of peritonitis.

*Examination.*—The attitude and appearance of these patients is heavy, anxious and flushed; they lie still on their back, sometimes on their side with the legs flexed. The tongue is furred and moist, and the breath offensive. Active *alæ nasi*, labial herpes or circumoral pallor suggest pneumonia, whilst cyanosis with dyspnoea with severe abdominal pain suggest a possible acute pancreatitis. The abdominal movement varies according to the severity and stage of the condition; sometimes its respiratory excursion is normal or is limited or jerky in the lower half. Later, part or all of it, becomes immobile, or in general peritonitis, the abdominal respiratory rhythm may be reversed, i.e. moving inwards on inspiration, outwards on expiration. This is a bad sign.

After inspection, ask the patient to blow out the stomach "like a fat policeman"; this gives an indication of the extent of the mischief and often causes pain in the right iliac fossa, or in a bad case the patient is unable to do it and makes very significant, vain attempts.

Hyperæsthesia is tested for with a pencil point (a pin or needle makes the average patient nervous

and apprehensive), stroking the abdomen in longitudinal and transverse directions, and also testing for sharpness of prick. In 40 to 50 per cent. of cases, it is present in the right iliac fossa and is good supplementary evidence of internal pathology; it is said to be an indication of an unruptured appendix.

By now, confidence has been gained and palpation can be carried out on an assured and receptive patient, rather than on an apprehensive and defensive one; this is a most important point in an obscure case. Now estimate the tension of the recti with the flat flexor surface of the fingers (avoid a prod with the fingertips) and continue it into the flanks. This is a valuable sign—the difference is frequently slight but definite, and is better described as “guarding” rather than rigidity; it is a positive early sign and, maybe, the only one coupled with the history. A tense flank suggests a retrocæcal appendix. The right iliac fossa is usually painful and tender and shows varying degrees of muscle tension or rigidity centred half-way between the umbilicus and right anterior-superior iliac spine; it may prevent anything being palpated. Very occasionally the actual appendix can be felt sometimes, a softish, tender movable mass is palpable which is probably the appendix wrapped round by omentum and not yet adherent to the parietes and rigidity is not present. This tempts hesitation in decision, and the loss of some valuable hours, until the signs become more definite by the inflammation spreading, fixing the mass and rigidity occurring. In an established case of several days, a fixed abscess or mass may be palpable in the right iliac fossa, or occasionally in the pelvis on rectal examination.

The rigidity in the right iliac fossa is the response of the parietes to the close underlying inflammation. When the appendix lies retrocæcally, in the pelvis or behind the mesentery it is not present to such a marked extent, probably, only tenderness on pressure and

slight guarding, being elicited. This is well demonstrated in the later stages of pregnancy; the uterus rising out of the pelvis, pushes the abdominal wall away from the cæcum and appendix and Nature's "guarding" reflex is not called into action. It is a real difficulty as appendicitis is as likely to occur then, as at other times, with the added difficulty of diagnosis, from the not infrequent pyelitis.

Rectal examination should never be omitted. It is of the utmost value, but it is well to explain carefully to patients beforehand what is going to be done; it helps to make the examination fully possible; ask them to differentiate between the discomfort of a finger in the rectum and that of real tenderness, as if one were "touching a boil." Anything from a slight tenderness in the right iliac fossa to appendicular masses like tense collars about the rectum or bulging abscesses may be discovered, besides pathology quite unsuspected and unassociated with the complaint being investigated, being discovered.

Note a tender cervix uteri; it tells of possible inflammation associated with the uterine appendages. Sometimes the rectum feels hot and capacious, the mucous membrane being velvety smooth. This is present in typhoid, whilst ballooning without the heat is frequently present in pelvic appendicitis and intestinal obstruction with a low-placed block.

Time is probably the most variable factor in the whole condition; the complete series of changes from appendicular obstruction to inflammation, to perforation and gross general peritonitis may occur in four hours, whilst again, several days may be taken for a case to develop. The following case illustrates this:—

A woman, aged 66, had sudden abdominal pain at 5 p.m. It became steadily worse, causing her to walk about. She was restless and then she vomited three or four times. At 7 p.m., her practitioner, a shrewd observer, was called in. He found no physical signs; temperature and pulse were normal but he was impressed by her severe pain and he called in after his surgery at 8.30 p.m. and found no change beyond a little tenderness in the right iliac fossa;

she was then lying down on a couch. He was worried "didn't like the look of her," so he saw her again at 10.30 p.m. before going to bed, and no material development having occurred, he advised hot fomentations. The temperature and pulse were still normal, the abdomen a little tender in the right iliac fossa, no more vomiting and the pain a little easier. At 11.30 p.m. he was sent for again. The patient felt much worse and finding the temperature 100° F., he asked me to see her. I operated at 12.30 a.m., removing a large perforated gangrenous appendix, evacuating much stinking, purulent fluid. This occurred in less than eight hours and it illustrates acute appendicular obstruction passing on to acute appendicitis; it shows the absence of change in the temperature and pulse, only slight physical signs and that once diagnosed, the treatment is operation.

A similar case was that of a man aged 60, awakened at 5.30 a.m. with severe abdominal pain and vomiting. He was sent to hospital as a perforated duodenal ulcer. His temperature and pulse were normal with a little tension in the right half of the abdomen and still severe pain. Operation at 9.30 a.m. revealed a tense mucocele of the appendix; the duodenum was normal. This case illustrates how severe and sudden in onset the pain may be, to cause the doctor to suspect a perforation. It is not often possible to foretell the pathology from the physical signs, which frequently hide gross pathology with slight signs and vice versa.

*Course.*—In one, two or three days the symptoms may pass on to those of general peritonitis or completely subside, this meaning acute catarrhal appendix probably, or an appendicitis with a local abscess may now be forming, when the severity of the symptoms will ease but not completely, and a tumour form in the right iliac fossa, in the pelvis or in the loin. The pyrexia persists mildly, constipation will continue or diarrhoea may occur; occasionally frequency of micturition with the pain at the end, suggests the appendix adherent to the bladder.

In abscess formation, after the fifth or sixth day, the pain may become more severe as the tension in the abscess cavity increases, and according to its situation, it may track through the abdominal wall to the groin, burst into the rectum, vagina or general peritoneal cavity with disastrous results and signs of general peritonitis. A retrocaecal abscess may track up and form a subphrenic abscess later.

*Treatment.*—The treatment of acute appendicitis is

surgical, and at once. The only contra-indications I know are cases of severe constitutional disease, like failing hearts, diabetes, nephritis, pulmonary tuberculosis, and overlooked cases with localized resolving abscesses. I am familiar with the school which watches appendicitis carefully and that it produces good results by medical treatment, but I am confident that surgical results are better, and a possible general peritonitis, suppurative pyelephlebitis or portal pyæmia avoided. I operate as soon as possible after diagnosis, and use general anæsthesia, spinal or local novocain infiltration according to the condition of the patient.

*Results.*—The average mortality of acute cases treated in the big London hospitals is about 4 to 5 per cent. Among my 350 hospital and private patients seven succumbed. The average length of stay for all cases in hospital was  $21\frac{1}{2}$  days, in catarrhal cases 16 days, in purulent and gangrenous but unperforated cases  $21\frac{1}{2}$  days, whilst in perforated cases it rose to 38 days, that is, double the time of the early cases, emphasizing the value of early diagnosis and prompt operation. I have seen almost all these cases several times since leaving hospital. In five cases—and these were all drained—there was an incisional hernia, the remainder being well. The length of time before operation did not bear any consistent relationship to the findings, unperforated cases existing after the attack had been in progress five days, whilst perforated cases occurred after eight hours. One patient died of intestinal obstruction 18 days after operation; he had a gangrenous appendix. Another had a perforated gangrenous appendix and died of asthma and cardiac failure a fortnight later, whilst three died within 24 hours of operation of toxæmia—they were neglected cases, one of pneumonia two weeks later, and one of paralytic ileus.

# Prognosis in Diseases of the Heart

By R. O. MOON, M.D., F.R.C.P.

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WHEN forming a prognosis in any given case of heart disease, the most important thing to be clear about is the cause of the cardiac lesion. Broadly speaking, we may divide cardiac affections into those which have been caused by rheumatism, chorea or scarlet fever, on the one hand, which manifest themselves in comparatively early life, and those which are due to degenerative and arterio-sclerotic conditions, or to syphilis, and which do not, as a rule, appear till about middle age. From the point of view of prognosis, it is more important to decide from which of these causes the cardiac lesion has originated than which valve is affected. Speaking generally, the prognosis is much more favourable in the rheumatic cases, where the lesion is apt to become stationary, whereas in the arterio-sclerotic and syphilitic cases the lesion is likely to be progressive. In very young children, however, though the lesion is nearly always rheumatic in origin, the outlook is generally serious, because so often the pericardium and myocardium as well as the endocardium are affected and there is in fact a "pancarditis."

## AORTIC DISEASE

Here the difference between that form of the disease which is due to rheumatism and that which is of degenerative or of syphilitic origin is most striking. The main point to realize is that the aortic disease of the rheumatic patient, apart from the risks of further



attacks of rheumatism, might be described as a static lesion, which carries with it a very favourable outlook not only with regard to length of life, but more particularly from the point of view of the amount of work which can be accomplished. This is the cardiac lesion in which the capacity for work is greatest. During the great war, it was surprising how often one encountered cases of aortic disease, which had slipped through the vigilance of the medical examination at recruiting and had yet carried on successfully in the infantry, only having to go into hospital on account of some surgical condition, or some fever, such as malaria, when the cardiac affection was accidentally discovered. From the public health and economic point of view, patients with this kind of lesion are capable of doing quite a good deal of work. Though, doubtless, handicapped in the race of life they need not follow a purely sedentary occupation, provided reasonable attention is paid to the nature of their work, to regularity of hours and to the way in which the unoccupied hours are spent.

Turning now to the arteriosclerotic form of aortic disease, here the lesion is almost necessarily progressive, though, with careful treatment, it may remain stationary for a time, but it can never really improve, owing to the changes which are fairly certain to have taken place in the coronary arteries. It is these changes in the coronary arteries which give rise to the most serious symptoms connected with aortic disease—namely, angina pectoris, which is serious, not only on account of the severe pain and alarming condition of the patient, but because it indicates the probability of considerable degeneration of the cardiac muscle and the consequent likelihood of sudden death. In the arterial forms of aortic disease, which are syphilitic in origin, one should be specially careful to give a most guarded prognosis, for though the symptoms in these cases may be considerably alleviated by anti-syphilitic

remedies, there seems to be a special liability to sudden death, owing to the fact that much of the myocardium no less than the aorta has been damaged by the syphilitic virus: there is, too, in these cases the likelihood of an aortic aneurysm developing.

As to the physical signs in connection with the prognosis of aortic disease, as a rule it may be said that the more collapsing the pulse the greater will be the regurgitation. Changes in the character of the murmurs are generally not of much importance; alterations in the cardiac dullness are more valuable, an increase in the transverse area of dullness being usually a bad sign, whereas an increase vertically is probably a good one. When the second sound in the aortic area and over the carotids is entirely obliterated by the diastolic murmur, it undoubtedly indicates that the amount of regurgitation is considerable, and to that extent the prognosis is bad.

#### MITRAL DISEASE

Here the association is nearly always with rheumatism, and mitral stenosis seems in particular to follow the less pronounced forms of rheumatism such as vague, indefinite pains in the limbs or stiff neck. As is now well known, this lesion is much more common in women than in men and for a long time may not give rise to any serious symptoms. Perhaps, owing to the greater tranquillity and more sedentary character of the lives of women, they may be less affected by the existence of the lesion than are men. In these cases the heart, as the French say, is *réglé pour un petit travail*, and with reasonable care such hearts may carry on for a long number of years and the condition should not necessarily be a bar to marriage or pregnancy. But when once the heart in these cases has begun to fail, its efficiency is not so easily restored. The narrowing of the mitral orifice causes an imperfect filling of the left ventricle; consequently the heart

obtains an insufficient supply of blood, so that cardiac weakness is thereby promoted. Mitral stenosis when established in late childhood has a more serious prognosis than when it occurs first in early adult life; this, doubtless, is partly owing to the fact that the stenosed orifice does not increase in size while the growth of the heart continues. These cases seldom reach the age of forty. An unfavourable feature is the development of catarrh of the bronchi and the more extensively the finer bronchi are involved and the more diffusely the process has extended the worse will be the prognosis. Hæmoptysis, however, is not necessarily a serious sign.

It must further be remembered that it is especially in the cases of mitral stenosis that auricular fibrillation is most likely to supervene. Much less common, of course, are the cases of mitral stenosis associated with arteriosclerosis. These necessarily have a less favourable outlook than the form we have just been considering, because here the lesion is progressive. It is in this form of mitral stenosis that thrombosis is most common, whereas embolism is more characteristic of the rheumatic form, giving rise, if pulmonary, to infarcts, while, if cerebral, causing hemiplegia.

#### MITRAL REGURGITATION

When of rheumatic origin and unassociated with stenosis, mitral regurgitation is far less common than was formerly supposed, because regurgitation used often to be diagnosed when there was little evidence of it beyond a systolic murmur at the apex. In early life the main danger is the liability to further attacks of rheumatism, which may render still worse the cardiac lesion which already exists, but with the lapse of years this liability becomes less.

The most satisfactory thing about mitral regurgitation is its amenability to treatment. Again and again the heart may break down temporarily with

a widespread cedema, yet again and again by rest and judicious treatment the patient may be restored to his former level of health. It is this power of recovery under treatment which has given to mitral regurgitation, when of rheumatic origin, its traditional and justly favourable prognosis. When, however, this lesion is of arteriosclerotic origin the prognosis is obviously more serious, for here we are no longer dealing with a quasi-mechanical valve lesion, but the valve lesion is part and parcel of a wider whole; the heart muscle, the arteries, and, it may be, the kidneys, being affected in one way or another, so that there is a most definite limitation to a patient's activities and the span of life is materially shortened.

#### AURICULAR FIBRILLATION

Of this condition much, of course, has been said of late years and it would almost seem to have taken the place of valvular disease as regards importance among cardiac lesions. Doubtless, until comparatively recently it was customary to give a very unfavourable prognosis in cases of auricular fibrillation, but this was because the first descriptions of the condition were taken from very serious cases of mitral stenosis when the heart was obviously failing. We now realize that fibrillation of the auricles may occur in other conditions, such as arteriosclerosis and in mitral cases, which are far from being very advanced. Though auricular fibrillation may start fitfully at first, and in fact paroxysmally, when once it has definitely set in it will usually continue for the rest of the patient's life. Since the condition is associated with a rapid and irregular action of the heart it necessarily tends to embarrass the efficiency of that organ and the prognosis depends on how far the heart can carry on its work with such an altered rate and rhythm. The normal activity of the auricles is not essential to the efficiency of the heart, but the fact of their being

diseased suggests that changes have also occurred in the cardiac muscle of the ventricles and it is this which finally causes a fatal issue. If in any given case we could be reasonably sure that the disease was confined to the auricles we should be able to give a much more favourable prognosis. This is the reason why the condition of auricular fibrillation has such a varying outlook: it is essentially a lesion of the auricles, but we have no sufficient means at present of being certain that the damage is confined to them and has not extended to the ventricles.

Fortunately it is just in these cases that digitalis proves most effective, and especially when the fibrillation of the auricles is connected with mitral stenosis of rheumatic origin the drug seems to act almost as a specific. Consequently by a judicious use of this remedy and, in certain cases, of quinidine, together with rest and a generally restricted mode of life, cases of auricular fibrillation may live on for many years, particularly if it has been found possible to avoid exhausting the ventricular myocardium by keeping down the ventricular contractions to about 70; but, of course, such patients will have passed definitely to a lower plane of activity.

On the other hand, auricular fibrillation occurs also not infrequently in cases of arterio-sclerotic conditions of the heart; here we have the older type of patient to deal with and, as a rule, the fibrillation is of more moderate grade and the patient may seem to be less affected by it. Unfortunately these cases do not respond so well to digitalis as do those of rheumatic origin in younger subjects. In such patients, then, the prognosis depends rather on the general cardio-sclerotic condition of the heart and blood vessels than on the auricular fibrillation *per se*.

#### MYOCARDITIS

Apart from the various valvular conditions which

we have been considering there lies the question of the state of the cardiac muscle, which may be seriously damaged without necessarily giving rise to any very obvious physical signs. Of recent years great attention has rightly been directed to the condition of the heart muscle in prognosis, but it is a mistake to suppose that this is an entirely new conception. Laennec himself had realized the importance of the cardiac muscle, regarding it as the key to cardiac pathology, and, he might have added, to the prognosis of heart disease. Stokes, too, said: "It is in the vital and anatomical condition of the muscular fibres that we find the key to cardiac pathology: for no matter what the affection may be, its symptoms mainly depend on the strength or the weakness, the irritability or the paralysis, the anatomic health or disease, of the cardiac muscle."

Often the history of the patient is a more useful guide to the prognosis than are the conditions present at the moment. The younger the patient the better on the whole is the outlook, as there is less likelihood of serious degenerative changes having set in; after middle age such changes are usually present and cardiac efficiency is seldom then re-established after it has once seriously given way.

The collection of numerous clinical details, both signs and symptoms, is comparatively useless in estimating the prognosis unless we can form some adequate picture of the cardiac muscle at its work. For instance, is the income and output of the heart just balanced, or is there a substantial reserve? If there is a reserve, is it disappearing, and how fast is it disappearing? We are too much in the habit of taking one lesion of the heart, it may be aortic regurgitation, or mitral stenosis, or auricular fibrillation, and basing upon it our diagnosis, instead of regarding each of these separate structural lesions as a part of the cardiac apparatus which is impaired and estimating how much

of the remainder is intact and healthy and capable of carrying on the necessary requirements of the circulation.

At present we have no means of mechanically estimating the efficiency of the myocardium. The effort syndrome is certainly helpful. An electrocardiographic tracing which shows an inverted T wave in Leads I or II gives us definite evidence of some myocardial degeneration, but does not enable us by itself to form a precise prognosis.

Stokes-Adams' disease and pulsus alternans are of grave prognostic significance; also when myocardial degeneration is associated with chronic nephritis the outlook is bad; above all the development in these cases of a cantering rhythm at the apex, implying that the ventricular wall is subjected to a strain to which it must necessarily yield, indicates that the end is not far distant. On the other hand, a myocardium, though greatly damaged, may continue to perform its functions fairly well, provided no extra burden is put upon it. Any illness, especially acute infections, such as influenza, may prove the last straw.

When the changes in the heart muscle are fatty rather than fibroid the prognosis is very serious; the more corpulent the individual the worse is the outlook, since it is hardly likely that the obesity can be reduced without damaging the nutrition of the heart muscle. The prognosis will usually be better when the myocardial impairment appears to be due to some rheumatic antecedent, because in these cases the lesion is more likely to remain stationary, whereas when due to arteriosclerosis the outlook is definitely worse, because here the lesion is likely to be progressive. Intermediate between these two causes is syphilis; here, too, the lesion is apt to be progressive and to affect a large part of the myocardium. At the same time, if the diagnosis is made early and active anti-syphilitic treatment begun, the prognosis may be much better

than in that of the arteriosclerotic cases.

#### MARRIAGE AND PREGNANCY

Here, of course, we are in the main consulted by youngish women with mitral stenosis and, undoubtedly, of late years experience has demonstrated that marriage is far oftener permissible than would have been thought advisable a generation ago. A woman with mitral stenosis should be permitted to marry and have children, when there has been no history of heart failure and when the initial rheumatic attack has been some years before and there has been no recurrence of the infection. If there has been such a degree of heart failure as to involve being in bed for several weeks, then marriage should certainly not be allowed, and well-established auricular fibrillation should be a bar to pregnancy. Patients with aortic disease seldom appear for an opinion on this question, but when the lesion is of rheumatic origin and there has been no cardiac failure, in my experience marriage is quite permissible.

#### ANÆSTHETICS

Cardiac patients, provided there is not much myocardial damage, bear anæsthetics remarkably well, when they are carefully administered. A mixture of chloroform and ether seems preferable to either alone; ether alone is apt to produce pulmonary congestion. Whatever anæsthetic is used, oxygen should be given with it if the operation is at all prolonged, also it is important for the patient to rest in bed for a few days prior to the operation.

#### CONCLUSIONS

In nearly all cases of heart disease the question of heredity and the family history are most important guides to the prognosis. There are some families whose members seem to have a myocardium which



begins to fail soon after middle age, without any definite antecedent disease. Age, temperament, the state of nutrition, the presence or absence of obesity, should all be taken into account in forming a prognosis. The habits and mode of life of the patient are important factors. Much will depend on how far suitable treatment can be carried out, at least on its negative side, such as moderation with regard to alcohol, tobacco, strong tea and coffee, and the possibility of giving up hard work. Clearly a man who can select his place of residence and spend the winter in a mild, dry climate is likely, *ceteris paribus*, to have a longer life than one who is obliged to work for his daily bread. Finally, some attempt should be made to estimate the patient's general vital force, or what Bergson would call his *élan vital*.

# Adolescence and Psychological Medicine

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BY virtue of his unique position in the social order the family practitioner is apt to be consulted upon matters which, in their essence, are not strictly medical. Of these none are more important than the problems of adolescence. The stammerer, the bed-wetter, the masturbator; the precocious child, the "difficult" child, the child with fears; the bad-tempered girl who is out of control at home, the young person who does not make any progress at school, the truant, the vagrant; the public schoolboy threatened with expulsion for pilfering or his less fortunate brother who has been charged with theft at the Juvenile Court; the young man who retires into a world of his own, or who naively imagines that money would provide the solution of all his difficulties; the aloof adolescent who has no friends, the young cocktail addict, or the boy who lives in constant dread, the result of some unfortunately acquired sexual knowledge; by these, and many others, may the medical adviser be confronted. This article aims at describing the method by which such problems may be attacked and elucidated, and a diagnosis, prognosis and plan of treatment satisfactorily evolved. The methods here described are those which we have found valuable because of their applicability to the most diverse problems, and the varied circumstances in which they arise, whether in private, hospital, or clinic practice.

Among the many interesting trends which characterize psychological medicine at the present

day, there is none more fascinating, or more far-reaching in its possibilities, than the study of personality. It has come more and more to be recognized that many "mental" and "nervous" breakdowns should be regarded primarily as a failure of the individual to cope with the stresses of life—a state of imbalance in the reaction between the whole personality on the one hand, and the environment on the other. The advances of knowledge and thought that have been made during the last fifty years in the spheres of both psychological medicine and sociology have done much to define the facts, and to throw light upon the problems they embrace.

And what of youth? We are accustomed to regard adolescence as the time during which the immature personality, as it were, gradually crystallizes into its adult form. The potter must fashion while his material is malleable, and for the psychiatrist the period of adolescence is big with opportunity as being the time at which the personality is taking shape before it sets finally in characteristic mould. During this period, if the individual is to adapt to adult life, very rapid development and adjustment must take place, and for this reason the process of adolescence is both a fearful and a wonderful one.

Owing to the march of civilization, the problem of adaptation to life is becoming increasingly urgent. Human life, though perhaps no harder in its material conditions than a hundred years ago, is, from the psychological standpoint, infinitely more complicated. The pace is faster. The individual is subjected to stresses of increasing subtlety—speed, noise, competition—to name but a few. This article is a plea for what may be called the "personality approach" to psychiatry.

#### ARGUMENT

**These preliminary remarks lead up to a consideration**

of personality itself and of the armamentarium, both inherited and acquired, with which the normal individual is equipped for facing the battle of life.

For clinical purposes it is convenient to conceive any given personality as being composed of four main elements: (1) Ego. (2) Temperament. (3) Intelligence. (4) Character.

(1) Under the expression "ego" are grouped all the mainsprings of human endeavour. These are the instinctive tendencies, the *vires a tergo*, the vital urges which drive the individual to maintain his existence and to propagate his species.

(2) The "temperament" is, as it were, the pattern according to which the instinctive energy is expressed. Temperament is innate, and, though it is capable of considerable modification, it has a physical basis, and stamps its impression upon the whole personality.

(3) By "intelligence" is meant, not knowledge or wisdom, but the innate capacity to profit by experience. Intelligence is the lamp which illumines the path through life, to the intricacies of which our energies and temperament must adapt with either a greater or less degree of success. The factor of general intelligence is becoming to an increasing extent a measurable quantity.

(4) In the process of adaptation there is formed the quality known as "character." The measure of character formation is the measure of the individual's power to overcome difficulties, the measure, whatever his material successes or failures may be, of his success as a whole personality. It will be understood, however, that the term character is not used in the sense indicated in the phrase "he's a character," a sense in which "character" and "personality" are synonymous terms.

Such being the framework of personality, the next step is to observe how the structure will be affected by the gusts of adolescence. During this period the

instinctive urges, or ego qualities, assert their forces in no uncertain manner. Those instinctive tendencies which we are accustomed to group under the heading of sex, and whose manifestations have been hitherto overt, now, with the approach of puberty, become prominent, and perhaps uncontrolled, possibly with serious consequences. The self-assertive tendencies become more powerful, rendering the child less submissive and amenable. This development may be so rapid, that what I have described as the gusts of adolescence may reach a gale force that shakes the whole fabric of the personality. If temperament be stable, and intelligence astute, the storm may not dislodge so much as a single chimney pot in the form of a passionate outburst; but if the support of these factors is insufficient, the whole structure will totter upon the verge of that catastrophe which society has christened "nervous breakdown."

The temperament pattern becomes more distinct at this time. The "style," the "nature," the "disposition," the "cut" of the individual become more clearly defined. It is now possible to speculate as to the future stability of temperament, a matter of the highest importance from the psychiatric standpoint. Temperamental features which, during childhood, though present, have played a negligible part, now appear destined to play a dominant rôle.

Normally, at about the age of sixteen years, the development of innate intelligence becomes complete, but may present some piquant situations from the very fact that the boy or girl, though armed with a sound intellectual equipment, lacks the wisdom and experience of its elders.

During adolescence the degree of character development becomes of vital importance. It is the indication of whether or not the innate factors are knitting together into a united whole capable of surmounting life's obstacles.

It is only when we survey the four corner-stones of personality with their individual variations, and then study the contribution which each is making in support of the whole structure, remembering at the same time the speed with which the newly-erected edifice hastens to free itself from the scaffolding of family life to become an independent unit, that we begin to understand the complexity of adolescence.

The problems which arise in any deviation from the normal may be due to the faulty fabric of one corner-stone, and the whole structure be suffering in consequence. Alternatively, two or more corner-stones may be faulty, or it may be that one corner-stone is straining under the weight which should normally be taken by all four squarely.

Just as the surveyor must satisfy himself that the building is stormproof, so must the psychiatrist satisfy himself that the corner-stones of intelligence, character, ego and temperament are sound.

It may be that sound corner-stones are well and truly laid, but that in the course of erection the building has been thrown awry by an external stress of abnormal force or duration; that is to say, some environmental factor such as a brilliantly clever younger brother, an over-anxious fussy parent, or a domineering office senior.

#### APPLICATION

*Investigation.*—In practice, the solution of problems such as we are considering in this paper is arrived at by the application of this hypothesis of "personality approach" to the individual case. Such application necessitates close investigation of both personality and environmental factors. Complete general medical examination with the object of excluding such organic causal factors as infection, peripheral irritation, glandular disturbance, physical or special sense defect, is, of course, a *sine qua non*; but this is only a prelude

to the working out of the full psychiatric situation, and it must not be taken for granted that a physical condition precludes the presence of psychological factors. It is not the function of this paper to indicate the stages in obtaining a psychiatric history of the patient, of his achievements and failures, of his family and the features of his environment, though knowledge of this background is indispensable to a complete picture of the personality. In approaching the personality itself, it is useful first to assess the level of general intelligence because this investigation will give information relative to ego and temperament that will prove of the greatest material value. In many cases it is sufficient indication to obtain some record of scholastic progress, though this must be studied in its widest and most inclusive sense. Where the problem is intricate, and in all cases where the school record is uniformly bad, recent scientific methods for assessing general intelligence should always be applied. Investigation of intelligence will either exclude altogether the intellect as a contributory factor to the problem, or it will throw considerable light upon the cause of the behaviour disorder.

Character development demands special study, and here, too, opportunity for observing ego and temperamental factors will be provided. The degree of character development may be arrived at by putting a carefully thought out system of questions to the adolescent concerned, and noting the responses. To present some definite situation to the patient, and to inquire how he would act under the circumstances is not a suitable method for assessing character. The responses to such tests are liable to be dictated by the accepted, rather than the personal, moral standards, while to ask a young person why a given form of conduct is wrong involves deliberation on his part, and the replies to this type of test are invariably self-revealing.

The ego factor may have manifested itself in the

course of the interview, if it has not already revealed itself in the history of the case. "*I know*," "*I can do it*," "*Let me*," are common remarks on the lips of the child with a pronounced ego, and, though modified, are evident in the adolescent as "*my opinion*," "*my view*," "*I think*," and the like.

Temperament, also, should it have positive significance as a contributory factor in the problem, will have revealed itself during the interview. If the temperamental pattern has not shown itself in sufficiently high relief to claim the psychiatrist's attention, he may rest assured that this is not the source of disquiet.

*Diagnosis.*—During the investigation certain definite disorders or well-recognized states of mind may exhibit themselves and immediately supply a solution to the problem. Among the more common physical diseases which simulate mental trouble and which are, therefore, liable to come within the psychiatrist's purview, are chronic epidemic encephalitis of insidious onset, in which the primary disease has escaped notice, the prominent feature being that of mental or behaviour disorder; chorea, which in the acute stage may manifest itself as a mental illness, and during which, unfortunately, patients are liable to be placed under care with a view to certification; early disseminated sclerosis, or cerebral tumour interfering with higher mental function.

Among the true psychological diagnoses we find characteristic disturbances in the realm of each of the factors of personality. Under disturbances of ego may be found those conditions in which there are ideas of inferiority or superiority, the "*inferiority states*." The term ego is sometimes taken to stand for positive assertion, but many failures in personality can be ascribed to lack of adequate development in the normal assertive tendencies. In the realm of temperament,



our studies become particularly interesting. During adolescence it is essential for the welfare of the individual that temperament should develop evenly and at a normal rate. A transient period of adolescent instability is, however, of common occurrence, and is responsible for many of the emotional outbursts, foolish escapades, hysterical manifestations, and episodes of abnormal behaviour which occur in young people. The adolescent passes through a difficult time when internal developmental stress is in process of adaptation to external environmental circumstances. At this time, a curious anomaly of reasoning power is frequently seen. The patient is inclined to be impatient of human shortcomings, intolerant of his elders, resentful of authority, but is quite incapable of realizing the simple economic facts of material existence. Prompted by instinctive urges, he may act unwisely, or form some undesirable sexual attachment. Such behaviour is rather the outcome of romantic, though mistaken, notions, than evidence of abnormal anti-social or vicious tendencies, and of which, after the lapse of a few months, the individual would not have deemed himself capable. In short, they indicate a temporary lack of balance due to an insufficient check being placed upon temperamental and ego factors by the developing character and ripening intelligence. Such, then, are examples of temperamental inadequacy in its milder and more transient forms.

It is when we consider the more extreme forms of temperamental pattern and instability that we are upon the fringe of a new classification of mental disease. The terms extroversion and introversion were introduced by Jung to describe temperamental extremes. This conception, obvious though the objections to it may be, has contributed greatly to the clarity of our thought upon this matter of temperament. The extrovert is characterized by

readiness of response and reaction to environmental stimuli, warmheartedness, and a tendency towards the continuous expenditure of energy. The introvert, on the contrary, is inclined to be cold, aloof, detached, "shut in." He tends rather to conservation of energy and to preoccupation with his own thought. Evenly balanced temperaments are those in which extroverted and introverted tendencies are in satisfactory combination. Any deviation towards either extreme may tend in the direction of a psychosis. At one extreme, that of extroversion, and cyclothymia, there is the whole range of what have been called the affective reaction types, the manic and depressive states. The keynote of these conditions is instability of affect, thought and conduct being dictated by the emotions. At the other extreme stands pronounced introversion which tends in the direction of schizophrenia or splitting of mind. Under this heading fall many of those cases which used to be called dementia precox; the terms dementia paranoides, paraphrenia, paranoia, though not originally so intended, correspond roughly to various age groups in the whole class of schizophrenia.

The flushed, over-active, restless child whose mind cannot apply itself to one interest for more than a moment or two, who is constantly distracted by some new game, new idea, new plan, new playfellow, and immediately allows the former ones to fade from his mind with no apparent regret, who prefers to play with others or to be entertained, is an extrovert, a potential case of manic-depressive psychosis, and we have seen such at the age of seven years, practically hypomanic in behaviour. The pallid, quiet, inert, unresponsive, unfriendly child, who appears lazy, dreamy, unintelligent though precocious, tardy in thought and action, who prefers to play by himself, or at some set game, is in reality a pronounced introvert, a potential schizophrenic.

The importance of the intelligence factor in diagnosis

cannot be over-estimated. In those cases where investigation of intelligence reveals extremes of intellectual development, whether above or below the average, it is essential that the features of the problem should never be considered apart from the mental age of the patient and his intelligence quotient. It is common for adolescents to be referred to as lazy, irresponsible, thoughtless, whereas examination shows that they have not, and never will have, their full complement of intelligence; the whole prognosis and plan of treatment in these cases depend upon the diagnosis in terms of mental age as distinct from the chronological age.

Finally, a certain number of the difficulties of adolescence will have to be considered as inadequacy in character development. It may be owing to adverse environment, lack of precept, laxness in discipline, that the deficiency has been acquired, and is, on this account, remediable. For the purposes of diagnosis, therefore, environmental influences must always be taken into account before the case is labelled as one of moral defect. But, unfortunately, a certain number of these cases would appear to be innately deficient in their ability to develop character and should be selected for stricter measures of control in order that much juvenile crime and recidivism may be prevented.

*Prognosis.*—There is no period of life at which a correct prognosis is of more vital importance than during adolescence. The parents are concerned to know, and they urgently enjoin the doctor to foretell, what the future holds, whether with regard to health, earning capacity, social relationships or parenthood, and what future liabilities the problem may entail.

It is hoped that what has already been said of the "personality approach" leads up to a conception of prognosis as being rather the end-result of a scientific

chain of reasoning, than the empirical fruit of individual experience, or speculation that is purely psychopathological. Having arrived, in each case, at the etiological factors that are contributing to the problem, and knowing, as we do, a considerable amount about the function and powers of development of each factor of personality, we move inevitably towards such logical and inescapable conclusions as are pointed by the facts. Take but one example, that of stealing. The offender may be unable to realize the nature or quality of his act; he is defective in intellect. It may be that, although of normal intellectual development, he is morally defective, incapable of developing a sense of right or wrong. It may be that theft is a reaction to some physical or material deprivation in his home surroundings; the result of instinctive self-assertion; the outcome of an urge to express himself; or an attempt at self-display; a preliminary to the generous gesture of purchasing a gift for purposes of obtaining the admiration, flattery or affection of others; finally, it may be due to impulse or obsession, the manifestation of some serious mental disturbance.

So diverse, then, are the motives for theft, that the chances of a recurrence in any one individual cannot be permitted to remain a matter of guesswork.

The "personality approach" yields a solution and a prognostic picture that carries with it, not only a sense of scientific achievement in the mind of the physician himself, but enables him to put the parents in complete possession of the facts, whether grave or hopeful, and at the same time render a valuable service to society.

*Treatment.*—Throughout medical practice, elaborate investigation, diagnosis, and prognosis is of little avail save it is crowned by the appropriate remedy. Each case must be dealt with individually and upon

its own merits, but all treatment of these adolescent disturbances may be divided into three categories :— (1) Complete change of environment. (2) Modification of present environment. (3) Treatment of the individual personality.

(1) Change of environment may be demanded, either because the environment is so unsuitable that a normal adolescent could not reasonably be expected to adapt to it, or because the patient's defects are such as to render him incapable of adjusting to the environment of his more normal fellows. The case may require removal to a mental hospital, a training school, an institution for defectives, a mental home, a colony, a farm, or different home surroundings. Change of environment is never to be recommended as a last resort where detention or punishment is the sole aim, but only when it is positively the best remedy. Further, it must be ascertained that the atmosphere of the chosen environment reflects the light of modern knowledge, that the patient will receive individual understanding, and that a constructive effort will be made towards utilizing what powers he possesses, with a view to his return to social life as an economic unit.

(2) It may be necessary to undertake the task of modifying the present environmental circumstances in order to bring about a successful adjustment. In addition to the problem itself, there may have grown up a situation that is based upon misunderstanding on the part of the patient and of those with whom he is associated and related. By patient effort it is often possible to eliminate these prejudiced, antagonistic, or defensive attitudes and re-establish sympathetic contact between the parties concerned. No pains must be spared to secure the understanding of all those in close daily contact with the patient—parents, relatives, teachers, or intimate friends—in order that all may co-operate in bringing about a satisfactory adjustment.

(3) Lest it be imagined that the patient would be

excused from bearing the burden of his own difficulties, while being treated with leniency and forbearance by all about him, it must be made clear that such is very far from being the case. The whole future depends upon the capacity of the individual to shoulder his own burdens, and, although there are cases in which this is manifestly impossible, where the patient possesses adequate mental equipment psychological treatment provides the means of accomplishing this end.

It may seem surprising, but, in practice, it has been found that by means of skilled personal contact the adolescent shows a remarkable ability to obtain insight into his personality, and understanding and mastery of his problem. He is easily fired by an inspiration that will carry him forward, at the moment when his courage and character would tend to falter. His ideals can be applied to the problem, and to correcting the faults in himself which he can be brought to realize.

Treatment based upon a scientific study of personality has very vast advantages over the rule-of-thumb methods that have existed heretofore; methods based solely upon punishment, methods that consisted of moralizing and preaching, methods confined to sympathy and encouragement, all of which are of value in themselves but ineffective when compared with the "personality approach" which is not only sound theoretically and applicable practically but amply justified by results.

# Internal Derangement of the Knee Joint

By R. J. McNEILL LOVE, M.S., F.R.C.S.

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THIS term should be only used to include intra-articular lesions occurring in a previously healthy joint, which are directly attributable to injury. Thus such conditions as separation of osteophytes in cases of osteoarthritis are excluded.

The term "internal derangement" is applied only too often as a convenient label for cases of injury followed by somewhat obscure symptoms and signs. Frequently a more careful history and examination would result in accurate diagnosis and appropriate treatment. It is sad to recall the numbers of cases, the majority of whom were potentially healthy wage-earners, who have wasted months with local applications, when it should have been obvious from the first that some manipulative or operative procedure was essentially the first step in treatment. Conversely, an ill-advised operation may further damage a deranged joint, and in addition to wasting the time of the surgeon and patient, tends to bring surgical measures into disrepute.

The injuries which produce internal derangement may be classified according to the structure involved, and therefore comprise the synovial membrane, ligaments, cartilage, bone, and loose bodies in the joint cavity.

(1) *Synovial membrane*.—The synovial membrane of the knee joint is extensive and complicated, the anterior part being of special surgical significance. From the antero-inferior part of the joint a triangular fold passes upwards and backwards to be attached to the anterior extremity of the intercondylar fossa. This fold is known as the ligamentum mucosum, and its free margins are termed the ligamenta alaria.

Synovitis following injury results in thickening of this synovial fold with consequent increased risk of its being nipped between the condyles and the tibia. This tendency is accentuated by associated œdema and swelling of the pad of fat which lies behind the patellar ligament, as when this fatty pad is increased in bulk the unyielding ligament in front necessitates a backward bulging. This results in the synovial fold being pushed farther back into the knee joint with a consequently greater likelihood of being nipped. Thus a vicious circle is set up—synovitis of the knee causes swelling of the synovial membrane and infra-patellar fatty pad; this tends to displace the synovial membrane backwards so that nipping is likely to occur; nipping causes a further inflammatory reaction and thickening of the synovia and fat.

A recurrence of these conditions may result in fibrosis of the synovial membrane and permanent thickening of the fatty pad. If the condition is allowed to persist degenerative changes eventually supervene, which may culminate in osteoarthritis of the joint.

Thickening of the synovial membrane follows a traumatic synovitis, which is a common result of a wrench or sprain. The associated synovial effusion obviates nipping as it distends the joint and therefore prevents the synovial membrane from slipping in between the condyles of the femur and the tibia. It is when the effusion diminishes that nipping is likely to occur, as œdema of the synovial membrane and peri-synovial fat requires longer to absorb than free fluid in the joint. Consequently all cases of synovitis should be treated by prevention of flexion of the joint until not only has fluid absorbed, but until thickening of the synovial membrane is undetectable. In the early stages of cases of traumatic synovitis the patient should be confined to bed and cooling lotions and a firm bandage applied. After two or three days the patient may be allowed up with a posterior wooden



or poroplastic splint, and massage applied to the joint and quadriceps muscle, and counter-irritants applied. If progress is satisfactory a Scott's dressing and strapping are applied after about fourteen days, and by this time the effusion has usually disappeared. The dressing is changed weekly and the condition of the synovial membrane, which is readily palpable on either side of the patellar ligament, is noted. When no swelling can be detected, usually about a month after the injury, the strapping is replaced by a crepe bandage and flexion gradually permitted.

If treatment is inefficient recurrent attacks of pain occur referred to either side of or behind the patellar ligament (Fig. 1). These attacks are not usually

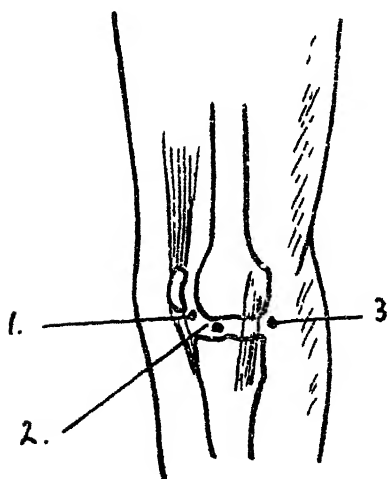


FIG. 1.—Showing positions to which pain is referred in cases of (1) synovial fringes, (2) torn cartilages, (3) loose body.

severe and are unassociated with locking. They are particularly liable to occur on extension of the joint, e.g. going upstairs. The attack may be followed by a transitory effusion and the vicious circle already referred to has commenced to revolve. In established cases operation may be necessary in order to remove the thickened synovial fringes.

(2) *Ligaments*.—Either the lateral or crucial ligaments may be damaged by injury. Although the lateral ligaments are not intra-articular structures, yet it is customary to include them under the term "internal derangement."

The external lateral ligament is rarely injured except in association with extensive injuries of the joint. On the other hand the internal ligament is

constantly in a state of strain owing to the normal condition of slight *genu valgum*. Nature compensates for this by attaching the ligament to the diaphysis of the tibia rather than to the epiphysis. Partial or complete rupture of the internal lateral ligament is followed by severe local pain and tenderness over the site of the injury, and if the synovial membrane is also torn a hæmorrhagic effusion occurs into the joint. Treatment consists of adequate rest and support until swelling has entirely disappeared, and if extensive laceration has occurred suture should be considered. When walking is resumed the sole of the boot corresponding to the side of the injury should be raised one third of an inch in order to relieve strain on the damaged ligament.

The crucial ligaments are torn only as a result of gross injury. The anterior may be ruptured by violent hyper-extension, but the posterior ligament alone is unlikely to be torn as flexion is limited by approximation of the calf and thigh. Both ligaments may be torn in association with lateral dislocations. Undue mobility and subluxation of the joint indicate the nature of the injury, thus if the anterior ligament is torn the tibia can be subluxated forwards on the femur. Attempt to suture a torn crucial ligament is unlikely to be successful as the injury is, in reality, avulsion of a flake of bone at the tibial attachment of the ligament. Reconstruction of ligaments has been practised, by drilling the bones obliquely and drawing through the resultant tunnel a strip of ilio-tibial band as a substitute for the anterior ligament, and the tendon of the semi-tendinosus for the posterior ligament. Owing to the tendency of these structures eventually to stretch, the ultimate results are disappointing. The most satisfactory treatment for rupture of crucial ligaments consists of a fortnight's rest in bed, in order to allow effusion to absorb. Aspiration of the joint is useful in order to expedite the removal

of effusion and to relieve discomfort. A plaster of Paris casing is then applied for a minimum of six weeks, after which time it is hoped that the torn ligaments have healed, or more correctly, the flake of bone united, massage and passive movements are instituted and the patient gradually attempts to regain active movement. Should instability persist then a knee support should be worn, a satisfactory type being that devised by Howard Marsh.

(3) *Cartilage*.—Fragments of articular cartilage may be chipped off the underlying bone. This is particularly likely to occur when a smart blow on the patella drives it against the edge of a condyle.

Much more commonly one of the semilunar cartilages becomes torn or loosened. The internal cartilage is affected twenty times as commonly as the external, as it is fixed by its attachment to the internal lateral ligament. It is beyond the scope of this article to discuss all the possible mechanisms which may lead to tearing of a cartilage, but one of the commonest is as follows.

During outward rotation of the femur on the tibia the associated movement of the more mobile external cartilage is transmitted by the transverse ligament to the anterior horn of the internal cartilage. This

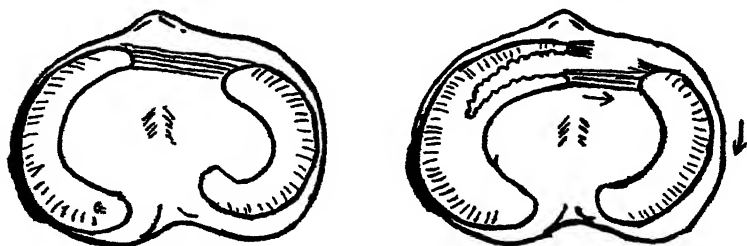


FIG. 2.—Showing the mechanism by which external rotation of the femur is transmitted by the external cartilage and transverse ligament to the internal cartilage, with consequent avulsion of its inner border.

sudden traction on the fixed internal cartilage rips it from before backwards (Fig. 2).

Relaxation of a joint, such as occurs after effusion or lack of exercise, is followed by slight abnormal

separation of the femur and tibia. Hence there is an increased liability for the cartilages to be caught between the articular surfaces of the bones, with consequent loosening or actual tearing of these structures. During the war in Mesopotamia epidemics of cartilage affections occurred at the end of the hot weather, owing to sudden resumption of normal activities.

The clinical features of injury to a semilunar cartilage consist of sudden sickening pain and inability to extend the joint. A rapid effusion follows, and localized tenderness is present over the intra-articular groove on the inner side of the knee (Fig. 1). A history of a previous similar attack may be obtained or volunteered by the patient.

Efficient treatment of the condition is of the utmost importance if subsequent convalescence is to be shortened and disability prevented. Complete reduction of the cartilage is essential, and should be performed without delay. This may be accomplished, preferably as a first-aid measure, by flexing the knee and hip, and placing the leg in a position of eversion and abduction. Sudden inversion and extension of the leg, e.g. by instructing the patient to suddenly "kick the leg straight" usually results in reduction. If this manœuvre fails, an anæsthetic must be given, preferably a general, in order to ensure muscular relaxation, and deliberate manipulation is applied in order to ensure satisfactory reduction, which is shown by the fact that the leg can be fully extended. A cooling lotion and a firm bandage are applied in order to discourage further effusion, and a back splint prevents flexion of the joint. Massage of the quadriceps is commenced about the third day after the injury, as these muscles waste rapidly. After three weeks it is hoped that the torn cartilage has united, but, in cases which do not recur, it is more likely that the torn portion has become adherent in such a position that subsequent movements do not again bring it between the articular surfaces. Moreover, the avascular

structure of cartilage and the rapidity with which the raw surface is covered by endothelium mitigate against union. Gradual flexion is then permitted, and subsequent events awaited. In between 60 per cent. and 70 per cent. of cases, recurrence follows, in which case operation is advised, as a repetition of conservative measures is unlikely to be successful, and repeated locking will lead to osteoarthritic changes. Moreover, the possession of a loose or torn cartilage is a potential danger, and in one case under the writer's notice a tragedy nearly occurred owing to a cartilage slipping in a busy thoroughfare.

Investigation of a series of cases indicated that operation in 84 per cent. gave perfect results, i.e. a painless joint with a complete range of movement, provided that the patient was under 35 years of age and had not had more than three attacks.

(4) *Bone*.—Small portions of bone are sometimes separated by injury, or avulsion of a tibial spine may be associated with a torn crucial ligament. If the bone is completely separated, it forms one variety of loose body. In examining an X-ray of a joint after injury the possible presence of a sesamoid bone in the outer head of the gastrocnemius must be remembered. The shadow of a sesamoid bone lies above the intra-articular groove, and the long axis is in the vertical plane.

(5) *Loose bodies*.—These may be derived from fibrin in the case of hæmorrhagic effusions, or synovial fringes, which have become ossified or chondrified, may separate. Attached portions of bone or cartilage have already been mentioned. Occasionally a loose body appears for no apparent reason, and one recently described was found to be a fibroma, irregular in shape and  $2\frac{1}{2}$  inches in its largest dimension.

The symptoms of a loose body resemble those of a torn cartilage, but are usually less severe, and pain is referred to the popliteal fossa (Fig. 1). Attacks of locking are less severe, although often more frequent, and the associated effusion is less marked. The

patient often learns the trick of so manipulating his knee that he can bring the loose body into a palpable position. Unless degenerative changes are so extensive that operation is useless, removal should be attempted. If the body can be manipulated into the subcrural pouch, it should be trapped in that position by a bandage around the lower part of the joint, and removed by a vertical incision. Failing this, exploration of the joint may be necessary, and if the loose body cannot be retrieved, it can sometimes be dislodged from the postcondylar pouch by means of a stream of sterile saline forcibly injected into the joint by means of a Higginson's syringe.

Operative details are beyond the scope of this article, but it may be stated that, if the diagnosis of injury to the internal semilunar cartilage is reasonably certain, then an incision, either curved or transverse, on the inner side of the joint, is adequate. The incision may be carried halfway around the joint without risk of injury to the internal lateral ligament, which is situated postero-internally. If free exposure of the joint is desired, a vertical incision splitting the quadriceps tendon skirting the inner side of the patella (which is dislocated outwards) and the patellar ligament gives good exposure. Sawing through the patella in a vertical direction with subsequent suture of the aponeurosis appears to predispose to subsequent osteoarthritis, and should be abandoned in favour of the previous method of exploration.

A recent method of exposure of the joint, based on that obtained in cases of fracture of the patella, consists of dividing the patella by means of a longitudinal (coronal) saw-cut. The anterior half of the patella remains attached to the patellar ligament and is turned downwards, while the posterior portion of the bone is turned upwards and remains attached to the quadriceps tendon. The writer has adopted this procedure in one case, and the exposure obtained was excellent.

# The Medical Properties of Wines

By G. MURRAY LEVICK, M.R.C.S., L.R.C.P.

IN discussing the physiological action of wine, it must be remembered that it is a mixture of compounds, and that the effect of drinking wine is not simply that of drinking diluted ethylic alcohol. Edward Mellanby says that "we may, without any serious inaccuracy, use the simple word 'alcohol' when we are speaking of the action of ethylic alcohol, whether it is taken as the chemically pure substance diluted with water, or in the more complex fluids such as beer, wine or brandy," but he refers simply to the ethylic alcohol factor. Moreover, it must be borne in mind that the effect of alcohol on the various classes of people who drink it should be estimated by the results not of alcohol from the laboratory shelf, but the effect of certain quantities of wine or beer or whisky, as the case may be. That is the aspect of the question to be considered in advising patients. Those experienced in drinking moderate quantities of wine know that the reaction to it varies considerably according to the type and condition of the wine drunk. Nor should too much reliance be placed upon the results of certain experiments based upon the injection of ethylic alcohol from the laboratory into the stomachs of dogs, the animals which have been used in many of the physiological experiments on alcohol. In the first place these results have almost eliminated the important psychical effect of alcohol, which is closely related to the physiological effect and may at times so predominate that alcohol taken even in sufficient quantity to do some physiological harm, may by its effect on the mind of the patient benefit him sufficiently to outweigh

the physiological harm in the long run. Such a case might be that of an over-worked business man whose mind is harassed by financial worry, or perhaps the type of man whose reactions seem to become monotonous from leading too blameless and sheltered a life. Some, indeed, might agree that an occasional over-indulgence of alcohol, if it is not habitual, may provide a wholesome shock to such a person. There is, moreover, a happy mean in which wine may be taken in a quantity that cannot be shown to harm a man physiologically, while it confers upon him the benefits of a well-digested dinner, a cheerful evening of relief from worries and a sound night's sleep.

In discussing the effect of wine, I shall first deal with the alcohol before comparing the other constituents which impart their widely differing characteristics to the various vintages. The alcohol investigation committee of the Medical Research Council<sup>1</sup> obtained results from their experiments with pure ethylic alcohol diluted with pure water, from which the following may be quoted:—One-fifth is absorbed in the stomach, one-tenth in the upper small intestine, one-half in the middle small intestine, and one-fifth in the third part of the small intestine. Its absorption into the blood is therefore complete and more rapid than, for example, meat or starchy food. The level of maximum concentration, which may be taken as meaning the maximum stimulating stage, is reached in from half to two hours. The speed of absorption varies in different wines, the strength of dilution and time in relation to meals. The fatty elements of milk delay absorption to a well-marked extent when alcohol is taken within  $2\frac{1}{2}$  hours of the milk. Meat delays absorption only very slightly. Absorption of alcohol from wine is slower than the same dose of spirit equally diluted with water. Absorption is quickened when a glass of water has been drunk an hour or so previously. The rate of



absorption in different wines has not been worked out, but my own experience goes to show that absorption is more rapid from white wines than from red wines of equal strength. With regard to dilution, Mellanby found that when a given dose of alcohol is given at 20 per cent. strength the alcohol is more rapidly absorbed and reaches a higher level of concentration in the blood than when the same quantity is taken in 5 per cent. solution. This is, of course, a matter of common experience, but should be remembered in prescribing alcohol for various conditions.

The ultimate feeling of calm well-being is better obtained with natural wines taken gradually during dinner than by strong drinks taken before it, partly owing to the gastric irritation of strong alcohol on the empty organ. This also is not conducive to sound sleep, especially in the early hours of the morning when the last of the meal passes out of the irritated stomach.

It has been said <sup>2, 3</sup> that alcohol diminishes neuro-muscular co-ordination, but this statement must be accepted with some reservation in view of the summing up of their experiments by the Medical Research Council and other evidence quoted below. I may give also here an instance to prove what has been said about the way in which the psychological effect of alcohol may do good. Of all games in which neuro-muscular co-ordination is essential, golf must come about, if not quite, at the top of the list. The open championship competition imposes a particularly severe nervous strain, and those very exceptional players who have reached the last two or three rounds feel this strain acutely, realizing that, among such perfect golfers, a small fault in the playing of a single shot in the most difficult of all games may cost them the match and the championship itself. I was told by a man who had been at the open championship competition this year that with one exception all the players in the last rounds even in the morning took a tot of alcohol

before going on to the tee. In the changing-room before they went out, they all seemed to be acutely nervous, and these experienced men knew that a little alcohol would improve their play.

Alcohol appears in the milk of inebriate women, but only when very large quantities are taken, and even then it appears in too small an amount to affect an infant.<sup>4</sup> In pregnant women, however, absorbed alcohol must, of course, affect the fœtus equally with its mother, and in ordinary circumstances appears to be undesirable. During and after middle age, especially in those leading sedentary lives, the vasomotor stimulation of alcohol may tend to favour the dispersal of those toxic deposits which tend in some people to take place in the fascia and fibrous tissue of various parts of the body. There is not any evidence that alcohol in moderation causes gout in people who feed judiciously; its effect as a gouty factor usually only becomes manifest when, especially in some form of sweet liquor, it is superimposed upon an over-abundant diet (*vide* p. 199).

Some, but probably very little, alcohol may be lost to the body in the breath and in the urine; there is none in the sweat. At least nine-tenths of the total dose has to be burnt up in the body. A man of ten stone disposes of 7·1 c.cm. of alcohol in an hour, or two-thirds of a pint of proof spirit in 24 hours. The combustion begins as soon as it enters the blood, but proceeds slowly so that very little has been burnt up before the whole is absorbed into the blood, and the maximum concentration bears a fairly regular relation to the original dose.<sup>5</sup> The result of the combustion is carbon dioxide and water which leave by the breath and urine. It means that the alcohol cannot leave the body until it has been burnt up in the tissues. The worst dangers of chronic alcoholism lie in the drinking of more alcohol before the tissues have completely got rid of the last dose. The "hair of the dog that bit

you " is a very inadvisable remedy for over-indulgence the night before. The liberated energy of alcohol is used by the body in the same way as the energy from ordinary food, but the whole food value of alcohol is its use by the body as a fuel, and it cannot be stored up and held in reserve as in the case of carbohydrates and fats.

This article is concerned with the effects of wine taken in moderation; the effects of excessive drinking have nothing to do with the subject and should not be allowed to influence our minds in deciding for or against the desirability of alcohol for the average man. Those who drink and enjoy wine in moderation know that it induces happiness and contentment. Temporarily it loosens the tongue a little, promotes friendliness and improves the digestion. Personally I feel fresher and better on waking in the morning when I have drunk at least a pint of claret at dinner than when I have drunk only water, and I notice the same result after quite considerably exceeding that quantity.

There are certain other effects of moderately large doses of alcohol it is well to bear in mind. Temporarily we experience a certain diminution of caution both in speech and action. Temporarily ability to undergo extreme exertion, perform balancing feats, make mathematical calculations and perform difficult feats of memory may be slightly impaired. These transitory effects do not matter in the least when wine is taken at a suitable time and are therefore no argument against its being taken at such a time, and in spite of the pleasurable stimulation of the brain, our minds may obtain a much needed rest from a host of those petty vexations that wear us out at times far more than the bigger difficulties of life, by modifying our attitude towards them.

The war taught many that periods of valuable relief from the anxieties of long-continued danger were to be obtained from a little alcohol. The rum ration

in France was a very humane thing. To a lesser degree these benefits may be conferred upon suffering people in peace time and I often think that there are many cases in which we might brighten the lives of certain patients by the judicious prescription of wine, and neglect to do so through not realizing the benefits it can bring when properly used.

In view of the mass of anti-alcoholic literature which has been appearing of late, it is important to speak quite plainly in criticism of certain exaggerated statements. For example, we read in the volume on alcohol of the Medical Research Council,<sup>5</sup> that "without signs of intoxication in the full ordinary or legal sense of the term, the bearing and general attitude of mind suffer temporary change likely to be fraught with serious consequences; the tactful handling of colleagues and observance of discipline are among these, and an additional source of friction is brought to complicate the relations between employer and employed."

Seeing that these results are stated to ensue from the drinking of a little alcohol, insufficient to produce any signs of drunkenness either in the ordinary or legal sense, I have no hesitation in saying that the statement is not only an exaggeration but actually the reverse of common experience. Paradoxically, however, they contradict this statement in their summing up of their results. There is another argument against attaching too much importance to the results of the laboratory experiments on the effect of small doses of alcohol. The temporary and slight impairment of mental function only noticeable after the most exacting tests, and the equally slight loss of physical control and endurance would probably be at least as great immediately after a hearty wholesome meal, and after other things incidental to a normal life. Again we read in the same publication: "Within half an hour of taking 40 c.cm. of alcohol there came on "in this person (a volunteer), a subjective feeling of lassitude and dis-

inclination for activity either of body or mind." This cannot be taken as an example of the effect of moderate drinking of wine or beer. To drink at a draught 40 c.cm. of pure ethylic alcohol from a laboratory bottle would be a silly act which no sensible person would perform in ordinary circumstances. In summing up the results of their experiments, however, two clear statements are made. A single dose of  $2\frac{3}{4}$  oz. of *proof* whiskey exerts little or no influence on the performance of simple muscular acts. It is also stated that there is evidence that the rapidity with which a simple act of memory is recalled may be increased by alcohol in moderate doses.

Experiments have shown that alcohol in moderate doses has no effect of practical importance upon the respiration. The only important effect here is the paralysis of the respiratory centre by very large doses such as to cause death by alcohol poisoning.

Whereas high concentration of alcohol may lower resistance to disease, small quantities may have the reverse effect. Parkinson<sup>6</sup> reports that drinking some 12 per cent. solution actually improved the formation of antibodies in the blood. This is confirmed by Friedberger.<sup>7</sup>

On the other hand it has been shown by Stillman<sup>8</sup> that pneumococci sprayed on mice infected the lungs more readily when the animals were intoxicated, but the infection was excessive as also the intoxication. The fact is that alcohol can produce opposite results according to whether the dose is large or small, and this must be borne in mind when considering the evidence that alcohol may reduce resistance. When a person is in the early stages of a severe cold, considerably more alcohol is required to produce the effect of even slight intoxication than at ordinary times. When we consider this interesting observation with the common knowledge that a mild "binge" quite commonly nips this complaint in the bud it

seems possible that the alcohol neutralizes the catarrhal toxin and vice versa.

With regard to tuberculosis the evidence is interesting. Homen<sup>9</sup> carried out work which suggested that alcohol increased the phagocytic power of the cells most concerned in resisting the tubercle bacillus. Mircoli<sup>10</sup> found the blood serum to be more antitoxic in tuberculous patients given alcohol than those without it, and animals so treated were more difficult to infect with tuberculosis than those without alcohol. Many statistics have shown that tuberculosis is less frequent among drinkers than among abstainers. For further evidence on this point reference may be made to a review on alcohol published in 1931.<sup>11</sup>

In hot climates alcohol should be taken with extreme caution; but the opinion of the majority with tropical experience is that those who take a moderate amount at sundown are in better health than those who abstain altogether, although the effects of excess are possibly increased in hot climates.

As regards the effects of moderate drinking, everything goes to show that wine, beer and cider are more advisable for habitual drinking than concentrated spirits. The wine drinker is less likely to take injurious doses of alcohol for two reasons; in the first place most wines contain alcohol in a suitable dilution; further the whisky or gin drinker gets into the habit of drinking solely for the stimulating effect of the alcohol. The wine drinker on the other hand can scarcely fail to develop a critical palate which raises the love of good wine almost, if not quite, to the level of an intellectual pleasure. The more this taste is developed the more likely is the consumption of wine to be sensible and moderate. I know a good many true connoisseurs of wine and among them excessive drinking is exceptional. Everyone will probably agree that the best time for taking alcohol regularly is the evening. The negative phase following the period of stimulation and the maximum narcotic effect will

then be reached during sleep, and generally have passed quite away by the morning.

On the effect of alcohol in moderate doses the summing up of the Medical Research Council's publication may appropriately be quoted: "We deal here solely with the physiological aspect of the alcohol question, and our consideration of this aspect leads us to recognize that the agreeable effects which the majority of people experience from the use of alcoholic beverages can be produced by doses of alcohol, moderate in quantity and taken in adequate dilution and at sufficient intervals, which will not, in normally constituted persons, be attended with appreciable risk to physical or mental health." This statement, which is made at the conclusion of a course of research work by accredited physiologists, appears to sum up very much in accordance with our common experience.

There is nothing in any of the various wines that is intrinsically bad for the average individual. At the same time, wine is an article of diet that is liable to affect the idiosyncrasies of different people. L. J. Llewellyn,<sup>12</sup> says that the palate and the stomach are the best criteria of the wholesomeness of a wine for each individual. He is dead against the habit of light-heartedly taking a gouty man off wine and putting him on whisky instead, and points out—as others have pointed out—that a good mature wine is, subject to idiosyncrasy, just as good for a gouty man as whisky. I would go further and say it is much safer for a man with a knowledge of wine who can detect a fault by its flavour much more easily than anyone can detect it in whisky. For a patient without such knowledge, it is of great assistance if his doctor knows enough of the subject to advise him what to buy. Sir James Goodhart said: "I am as much as ever an opponent of the prevailing dictum 'you must not touch wine, you must drink whisky'." In discussing the treatment of uric acid he says: "It is one of the most mistaken and mischievous beliefs

that ever plagued a world."

It is important for the practitioner to remember that it is the quality of the wine as much as its name which really matters. For example, an immature or unsound claret has just those faults of which a good claret is entirely free. It is usually held that a dry wine is better for gouty people than a sweet one, but possibly this statement need not be made of all individuals. The alcohol and the sugar of wine occupy much the same position in the dietary of a gouty person as the nuts with which port used so often to be drunk. Nuts, which are especially rich in protein, may cause a disturbance of metabolism when eaten at the end of a heavy meal. Wine, and especially sweet wine, may upset a gouty person when drunk with a meal rich in carbohydrate or after too big a meal. In this case the meal itself is just as much to blame as the wine. For this reason port took too much of the blame for the gout of our forefathers; it was simply "the last straw" and nothing else.

The consideration of the prescription of the various wines is a much simpler matter than was formerly supposed. From the dietetic standpoint we may regard them as follows:—

*Claret*.—Water with from 6 to 11 per cent. of alcohol; tartaric acid, 5 per cent.; tannic acid, about 0·08 per cent.; no sugar.

*Burgundy*.—Water, with 9 to 13 per cent. of alcohol; tartaric acid about 5 per cent.; tannic acid, about 0·05 per cent.; either no sugar or just a trace.

*Sauterne*.—Alcohol, 9 to 13 per cent.; acid, 5 to 7 per cent.; sugar, from 0 to 7 grains per ounce.

*Hock*.—Alcohol, 9·5 to 13 per cent.; acid, 5·3 to 6 per cent.; no sugar.

*Moselle*.—Alcohol, 8·7 to 9·4 per cent.; acid, 4·8 to 7·6 per cent.; no sugar.

*Champagne*.—Alcohol, about 12 to 14 per cent.; acid, 4 to 5·2 per cent.; sugar, from 6 to 24 grains per ounce.

*Port*.—Alcohol, 20 to 23·2 per cent.; sugar, 16 to 34 grains per ounce; acid, 3·6 to 5 grains per ounce.

*Sherry*.—Alcohol, 15·4 to 24·7 per cent.; sugar, 0 to 18 grains per ounce; acid, 3·3 to 4·8 grains per ounce.

The above analysis is all that need be considered



dietetically. A good deal of misconception exists about iron in wine; claret and burgundy are often prescribed on the fallacy that they are rich in ferruginous matter. As a matter of fact, there is a very minute trace in these wines which may play just a small part in adding to their colour, but that is all. For example, Mulder found that burgundy may owe a very little of its colour to tannate or oxide of iron, but the quantity is too small to be considered physiologically. The flavour and aroma of the various wines which were very carefully analysed by Prof. Mulder of Utrecht are due to the presence of substances so minute in quantity that a large bulk of wine is needed to obtain sufficient for analyses. The characteristic vinous smell and flavour are due to cœnanthic ether. This ether exists in all wines as an infinitesimal trace. It is a product of the fermentation of the sugar. In course of time, as the wine matures, acetic, butyric, caproic, caprylic, and some other ethers are formed, all in dietetically inconsiderable quantities. In the older wines quite a large number of other ethers appear, but various odoriferous substances impart their characteristics to wines of different localities because they vary in the locality where the grapes are grown.

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- <sup>5</sup> "Alcohol," 2nd edition. H.M. Stationery Office, 1923, p. 25.
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# Practical Notes

## *Etiological Factors in the Development of Exophthalmic Goitre*

W. A. Plummer and Charles Mayo, 2nd, have come to the conclusion that in cases of exophthalmic goitre or hyperthyroidism from adenomatous goitre, in which the onset of symptoms was attributed to acute infection, nervous shock or operation, a critical review of the histories will usually indicate that the disease was present before the acute infection, nervous shock or operation. In the isolated cases in which the time of onset of the toxic symptoms of goitre coincides approximately with some major operation, not of the thyroid gland, the relationship may be coincidental. Even in cases of exophthalmic goitre, a disease which many observers believe is based on constitutional predisposition, major operations and their associated factors, such as acute and chronic infectious processes, fear and trauma, do not usually precipitate the disease. In spite of the infrequency of cases in which the development of exophthalmic goitre and of hyperthyroidism from adenomatous goitre approximately coincides with that of some major operation not related to the thyroid gland, and admitting the possibility of coincidental relationship, the authors believe that the evidence obtained in the cases so far studied tends to support the contention, frequently held, that acute or chronic infectious processes are precipitating or aggravating factors in the development of exophthalmic goitre or of hyperthyroidism from adenomatous goitre if persons are predisposed to these diseases. That infectious processes, in the etiology of exophthalmic goitre, affect the thyroid gland specifically or directly has never been proved. It is probably the consensus of opinion that they play an etiological rôle only in certain cases, and then by lowering the resistance of the patient, by exerting some unusual stimulation on the thyroid gland, or in some other indirect, non-specific manner.—(*Surgery, Gynecology and Obstetrics*, December, 1931, liii, 721.)

## *The Treatment of Hyperthyroidism by Radiotherapy*

J. Maisin, F. van Goidenhoven and others publish an important contribution from Louvain on the treatment of hyperthyroidism by X-rays and radium; 30 cases were treated by X-rays, of which 20 were typical exophthalmic goitre, 6 toxic adenoma, and 4 atypical hyperthyroid cases; 91 cases were treated by radium, 64 of them typical exophthalmic goitre, 16 toxic adenoma, and 11 atypical forms. The authors have come to the conclusion that radium has many advantages over X-rays in the treatment of hyperthyroidism, and out of the 30 cases treated by X-rays, the 9 which did not benefit by this treatment improved very much on subsequent treatment by radium. The authors state that in their opinion the results of treatment by radium are as good as by thyroidectomy. Treatment with iodine can be employed in association with treatment by radium, but the patient must be watched very closely.—(*Revue Belge des Sciences médicales*, 1931, iii, 785.)

### *The Treatment of Achlorhydric Dyspepsia*

J. Moore Andrew states that there are many cases of dyspepsia, often overlooked, in which the test meal reveals diminution or absence of free hydrochloric acid in the gastric juice. The therapeutic test of administration of acid is of value in those cases which do not give an early and maintained response to alkali treatment when organic and reflex causes for the dyspepsia have been excluded. Confirmatory test meal, at least by the qualitative method, is useful as a guide to treatment. It is important to recognize the relation of achlorhydria to the pre-anæmic state and the early spinal cord changes of Addisonian anæmia. Treatment, to be effective, must be directed first against the cause, where this is possible. It is necessary to insure that the teeth are in good order and sufficient in number, so that the food can be masticated properly. Septic teeth, tonsils and antra should be eradicated, if present. Worries, anxiety and overwork, should be removed as far as this is possible, especially if nervous symptoms be present, and, if the blood pressure be low, rest should be enforced. There is no need for the restricted dietaries that are necessary in the treatment of ulcerative conditions of the stomach. Certain principles guide one in advising the patient as to diet. First, the food should be taken as dry as possible to minimize dilution and consequent diminished concentration of acid available for gastric digestion. Secondly, the taking of excessive protein is unwise, except in so far as its aroma stimulates appetite, for it needs more acid for the initial stages of its digestion than does carbohydrate. Thirdly, fatty foods and those cooked in fat should be avoided, as fat, by absorbing free acid, inhibits digestion. Hydrochloric acid is the specific drug in the treatment of these patients. For guidance in the administration of acid Beckman recommends, among others, the following principles: (i) Give the acid in as large amounts as possible compatible with the tolerance of the patient, up to 10 mils (2.5 fluid drachms) per day. (ii) Use the acid in fractional doses, commencing during the meal and continuing through digestion for at least half an hour. (iii) A meal of carbohydrate only, given with the full dose of acid, is valuable in that it induces a condition of free gastric acidity. Bromides combined with various glycerophosphate syrups have been used in those cases where the nervous symptoms loom large while liquor atropinæ sulphatis is given before food in cases showing marked pyloric spasm. Where a definite anæmia exists, iron and arsenic may be added to the mixture containing acid, and liver, 180 grams (six ounces) per day, or its equivalent in reliable brands of liver extract, is added to the dietary.—(*Medical Journal of Australia*, November 21, 1931, ii, 644.)

### *The Treatment of Gastric and Duodenal Ulcers*

J. W. Hinton has studied the results of treatment in 324 cases of gastric and duodenal ulcers in the combined medical and surgical clinic for the study of this disease in Bellevue Hospital, New York. It was found that a large percentage (214) of cases of both gastric and duodenal ulcer occurring in patients who seek treatment in a city hospital can be carried along under medical care with very

satisfactory results, and if one will refrain from operating upon these patients early in the course of the disease and refer them only after every attempt at medical treatment has failed, the surgical results will be most gratifying with conservative types of operation, either gastro-enterostomy or, in selected cases, of pyloroplastics. Any attempt to call a patient cured after either medical or surgical treatment unless followed for a ten-year period, and frequently examined, is most misleading.—(*Annals of Surgery*, December, 1931, xciv, 1044.)

### *The Treatment of Hæmophilia by Protein Sensitization*

R. Cannon Eley and S. H. Clifford have treated eight children suffering from hæmophilia by protein sensitization (intradermal injections of horse serum) for a period ranging from a few months to more than two years. In each case there was a definite reduction in the coagulation time of the capillary blood. However, it should be emphasized that the coagulation time of the venous blood was not altered. The treatment proved of no value in controlling hæmorrhage from the larger blood vessels or in preventing the occurrence of hæmorrhagic effusion into joints, subcutaneous hematomas or intestinal bleeding. The therapy was, however, of convincing benefit in the prevention or control of bleeding from superficial injuries. Despite its limited benefits, this method of treatment is of sufficient value to be advised in every case of hæmophilia.—(*American Journal of Diseases of Children*, December, 1931, xlii, 1331.)

### *The Causation of Colds*

H. Schade suggests that the determinative factor in the causation of "chills" and "colds" is not the degree of cold shown by the thermometer, but the extent of chilling resulting from the joint effect of all the weather conditions prevailing. The relation between chills and colds (including muscular rheumatism) and the chilling capacity of the weather is proved from large-scale statistics by the regular parallel movements of the curves of these disorders with that of frost-bite. In the action of cold in the causation of disease, three kinds of processes must be distinguished: (a) Alterations in tissue colloids of the nature of gelosis at the point of attack by the external cold; (b) action of cold at a distance, distributed throughout the whole of the human body, principally in the form of stimulation of the sympathetic nervous system; (c) lowering of resistance to infection, found in human beings and other forms of life. A characteristic feature of the "period of colds and chills" in the statistical tables is the variety of disorders met with. The harmful effects of cold on the tissues are characterized by an incubation period, a time-law of latency, cumulative action and selective action in the deeper tissues, of a very similar nature to those known to be caused by visible and invisible rays. Even a slight amount of chilling can produce disorders of the human body, if the conditions favourable to "insidious entry" are present in the tissues. The problems of the action of heat and cold on the human body are in many respects physico-chemical, and demand for their solution molecular pathological research.—(*Archives of Medical Hydrology*, January, 1932, x, 11.)

# Reviews of Books

*Thomson and Miles' Manual of Surgery.* By ALEXANDER MILES, M.D., LL.D., F.R.C.S.E., and D. P. D. WILKIE, M.D., F.R.C.S. 8th Edition. Oxford University Press. London: Humphrey Milford. 3 Vols. Pp. 1,837. Figs. 656. Price 12s. 6d. each volume.

THIS well-known textbook, the former two-volume Thomson and Miles re-written in three volumes, has preserved its old appearance and make up. The volumes are octavo, the printing close, and the text interspersed with many illustrations, for the most part photographs. The authors have been assisted by many collaborators, all present or past Edinburgh teachers, so that the reader can get a fairly complete picture of the conceptions regarding surgical matters in that school. These may be epitomized as soundness with a tendency to conservatism, as indeed may probably be said of the teaching of any great medical centre in this country. A surgeon reading any large surgical textbook will find on most pages matter for comment and we are surprised that in the chapter on gangrene the only reference to sympathetic surgery is one line on periarterial sympathectomy, though we agree that in amputation the tourniquet should be avoided. Under "actinomycosis" there is no mention of the appendix, though under "appendix" this disease receives a reference, but we are surprised that actinomycosis of the appendicular region is considered rare and that no mention is made of the good results that are usually obtained with the combination of drainage, open air and iodine medication. Under acute abscess we should like to see some discussion of the indications for early or late incision, the treatment advocated being merely that of letting out the pus. In the section on bones, there is no reference to the relation of parathyroid tumours to generalized osteitis fibrosa, but we do not quarrel with the authors for omitting all mention of the modern ultra-conservative methods in acute osteomyelitis. Brodie's abscess is to be drained, whereas it is our experience that in the majority of cases, after opening the abscess, healing by primary suture may be attained. The section on head injuries has been carefully written, but we cannot agree with the apportioning of three whole pages to the rare condition of extradural hæmorrhage, while no mention is made of the far commoner and much more important chronic subdural hæmorrhage. In discussing intracranial hæmostasis, especially of the venous sinuses, no mention is made of the most efficient and easiest method—Horsley's muscle-graft. The chapter on the breast is short and it is characteristic of an old tradition that the only illustration of fibroadenoma depicts a vast growth such as the student never sees at the present time. Few will agree with the advice to give Lugol's iodine for three months after thyroidectomy for toxic goitre. These are a few criticisms of the matter, but when we emphasized the soundness of the whole we indicated the very great preponderance of the good over the questionable. We are gratified to note that operative detail hardly finds a place and we are pleased to see in a modern textbook that the treatment of acute appendicitis is described without qualification

as that of removal of the appendix as soon as the diagnosis has been made, with none of the reservations now popular in some quarters, as to withholding operation after forty-eight hours. We did not find a misprint and we are of opinion that this famous work has been worthily rejuvenated and will continue to hold its place among the pre-eminent surgical textbooks.

*The Management of Abdominal Operations.* By RODNEY H. MAINGOT, F.R.C.S. London: H. K. Lewis & Co., Ltd., 1931. Pp. 301. Price 7s. 6d.

THIS is a convenient volume at a reasonable price, fulfilling the needs of many practitioners as a readily accessible reference in the treatment of surgical abdominal disease. Mr. Maingot's scheme gives much associated detail in addition to the actual "management" of cases, but the inclusion of various alternative methods gives an impression of over-treatment. This over stressing of many valuable forms of treatment cannot be commended as a guide for the practitioner: for example, we cannot approve of the generalized recommendation of repeated doses of morphine, the administration of blood transfusions to the extent advised in hæmatemesis, and the amount of interference in some conditions associated with extreme degrees of shock. The adoption of Fowler's position prior to operation in patients with perforations of ulcers is not countenanced by the patient's condition as usually presented. Further details regarding the after-care of colostomies would not be amiss, in view of the lack of instructions available in the general surgical literature. The space devoted to the post-operative care of "chronic appendicitis" seems to be unnecessary, as these cases usually progress with uninterrupted recovery. Some chapters cover their subjects excellently, particularly that in relation to blood transfusion, in which the great importance of careful and complete investigation of compatibility is observed, and that on the treatment of gastric and duodenal ulceration, when the dietary is an essential subsequent to any surgical measures. Many useful points appear throughout the book, especially in respect of such minor complications as are wont to occur without obvious cause, but which exhaust the patient from their persistence without relief by ordinary measures.

*Diseases of the Stomach.* By HUGH MORTON, M.D. London: Edward Arnold & Co., 1931. Pp. vii and 184. Illustrations 8. Price 10s. 6d.

IN the first ten chapters the various diseases of the stomach are systematically and concisely described with inclusion of the modern methods of diagnosis and treatment, and in a final chapter the test meals and other diagnostic tests are tabulated. In the account of gastric neuroses, which follows that of gastritis, the pain of hyperchlorhydria is described and attention drawn to its spread to the precordial region, thus suggesting angina pectoris. The chapter on peptic ulcer naturally includes duodenal ulcer, which is accompanied by a good radiogram, another, and striking, one of an hour-glass stomach appearing in the subsequent section on deformities. In the treatment of ulcer, tobacco and alcohol are strictly prohibited, and the author wisely adds that it is quite unnecessary to restrict business letters, as often the worry thus caused would be more

harmful than any resulting from their contents.

*Ultra-Violet Therapy.* By AUSTIN FURNISS, L.R.C.P., L.R.C.S., L.D.S., D.P.H. London: William Heinemann (Medical Books) Ltd., 1931. Pp. xii and 365. Figs. 70. Price 12s. 6d.

THIS valuable and comprehensive source of reference with its modest sub-title "a compilation of papers forming a review of the subject," appears at an appropriate time; for, as the author points out in a chapter dealing with its possible dangers, ultra-violet ray treatment by unskilled individuals is extremely risky, and even those best qualified to employ this therapeutic agent are, in some respects, imperfectly acquainted with its properties. Dr. Furniss, who has collected and sifted an enormous amount of material in his previous papers and in addition has a wide practical experience, takes a broad view of the uses of ultra-violet therapy, fully recognizes its present limitations, and wisely insists on its value in preventive medicine and in conjunction with other methods of treatment. The volume opens with an account of the history and development of the subject, then deals with the physical properties of radiation, mentioning here Dirac's new theory of matter, discusses the dosage and the various forms of lamps, the action of ultra-violet light on the skin, photo-sensitization, and other essentials. The remainder, two-thirds, of the work, deals with the therapeutic applications in various diseases and is a mine of useful information. In short the author must be congratulated on having provided the profession with the best available book on this subject.

*Allergy and Applied Immunology.* By WARREN T. VAUGHAN, M.D., London: Henry Kimpton, 1931. Pp. 359. Price 21s.

THE appearance of another book on allergy indicates the interest which this subject is arousing. In this instance the writer has had the advantage in America of the discussions of the Association for the Study of Allergy and also the Society for the Study of Allergy and Allied Conditions. Dr. Vaughan gives an excellent review of the subject from the essentially practical points of view and succeeds in showing that the specialist in allergy has a much wider field than at first sight appears. Probably the greatest value of the work is to give an idea of the vast number of ways in which allergy may arise, and a large amount of space is devoted to details of allergic sources and the times and circumstances when sensitization may arise. On the more scientific side the volume is superficial; the statement that adrenaline is obtained from suprarenal cortex is, we trust, accidental. It is interesting to note that the author ignores the possibility that psychological states may be grafted on allergy, and scoffs at faith-cures, forgetful of the fact that if he admits, as he does, the possibility of a nervous trigger mechanism, he must admit the possibility that the mechanism may be stimulated psychologically and that if the psychological element is allowed to persist, treatment may be ineffectual. In treatment, Dr. Vaughan chiefly discusses methods and forms of desensitization or what he calls hypo-allergesis, together with a short review of general vaccine therapy. This accounts for "Applied Immunity" occurring in the title. The book does not add very materially to our knowledge of the subject, but gives a most readable account of it.

*An Index of Prognosis and End-Results of Treatment.* By Various Writers, edited by A. RENDLE SHORT, M.D., F.R.C.S. Fourth Edition, fully revised. Bristol: John Wright and Sons, 1932. Pp. xi and 599. Price 42s.

PROGNOSIS is the most difficult part of medical practice and the success of this popular source of reference proves that it meets a real demand. Since the last edition many changes have become necessary; the important account of mental diseases, originally contributed by the late Sir Thomas Clouston, has been entirely rewritten in accordance with the new classification by Dr. H. Devine and occupies twenty-five pages. The articles on diabetes mellitus, pernicious anæmia, and nephritis have also been rewritten: most of the surgical and gynecological articles have been greatly altered, and, as the editor points out, the revision has been so complete that about half the volume is new. There are thirteen new contributors, and among them Dr. G. Bruce Perry shares with his senior colleague, Dr. Carey Coombs, the responsibility for most of the articles on the circulatory system. The editor, who has taken a large share of the burden of the articles on general surgery, must be warmly congratulated on the results of his labours.

*St. Bartholomew's Hospital Reports.* Vol. LXIV. London: John Murray, 1931. Pp. xxv and 231. Plates 10. Figs. 25. Price to subscribers, 15s.; to non-subscribers, 21s.

THE first of the twelve articles in this volume, which in addition contains the Proceedings of the Abernethian Society and the Paget Club, is a sympathetic *In Memoriam* of the late Sir Francis Champneys, a many-sided man and distinguished outside his profession as a musical composer. He was the first to use Lister's antiseptic methods at the General Lying-in Hospital, and it is interesting to note that in an article in this volume on the chemical prophylaxis of streptococcal infections, Dr. L. P. Garrod, bacteriologist to the Hospital, refers to his tests of fifteen germicides which show that lysol is unsuitable, whereas monsol, izal, cyllin, acriflavine, and the combination of brilliant green and crystal violet, known as "blue paint," are probably of value in midwifery practice. Professor H. H. Woollard explains the scientific basis for ablation or section of the sympathetic supply of muscles in spastic paraplegia, and Mr. W. J. H. M. Beattie gives an admirable account of achalasia of the cardia due to degeneration of Auerbach's plexus in the walls of the œsophagus. Mr. Raven provides a useful article on cancer of the œsophagus and Mr. R. Phillips a valuable review of buccal cancer. Dr. Wilfred Shaw and Mr. J. H. Johnston's experimental research into the production of metastatic ovarian tumours throws some doubt on the usual view that it is due to gravitation spill. In a generously illustrated article, Mr. R. T. Payne sets out the technique and applications of sialography or the demonstration of the salivary ducts by means of injection of substances opaque to X-rays, and Mr. Girling Ball and Mr. Payne deal similarly with excretion pyelography. Mr. Hosford writes on fractures, and Drs. Maxwell and Franklin on the cause of death in chronic renal disease.



# Preparations and Inventions

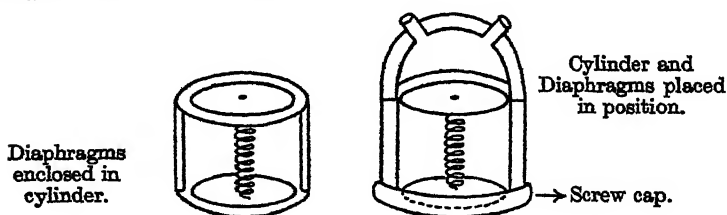
## THE "CHIROTHERM"

(London : Messrs Watson & Sons (Electro-Medical), Ltd., 43, Parker Street, Kingsway, W.C.2.

Surgical diathermy is now being widely employed with satisfactory results in breast amputation, thyroidectomy, abdominal and thoracic surgery and other operative procedures, and although many types of apparatus have been introduced for the coagulation of tissue and, latterly, for cutting by means of the diathermy current, up to the present none has been entirely satisfactory. This new instrument, the "chirotherm," has many advantages: in it the tungsten spark gap has been discarded in favour of the thermionic valve, with which there is no limit to the power available, while it operates automatically and requires no attention; moreover, it can be successfully operated by a nurse with little or no experience. The instrument has been produced in collaboration with surgeons experienced in diathermy, and in a demonstration which was given to us it certainly seemed to fulfil all the claims made for it.

## A NEW TYPE OF PHONENDOSCOPE

Dr. F. O'Sullivan (Cwm, near Newport, Mon.), writes :—The following is a description of a type of phonendoscope chestpiece which I have devised and which I find gives excellent results, magnifying sounds without distortion. The chestpiece consists of double vulcanite diaphragms, connected by a spiral spring, enclosed in a metal cylinder, and the whole fitting inside the metal chestpiece, as shown in sketch.



The cylinder and vulcanite discs are retained in position by means of a metal screw cap. The inside of the outer dome is grooved to allow of free vibration, without coming in contact, and the screw cap is designed so as not to interfere with free movement of the diaphragm when in contact with the chest wall. The instrument was made through Messrs. R. Sumner, Ltd., Liverpool.

## NURSES' APPOINTMENT BUREAU

Practitioners will be interested to know that owing to the popularity of this new service, Messrs. Cow and Gate have opened special offices at 1a, Grosvenor Gardens, S.W.1, for interviewing, and they have many nurses and nursery governesses of the highest standing on their books. Particulars can be obtained from the Secretary at the above address.

## The Significance and Pathogenesis of Certain Dermatoses

By H. W. BARBER, M.A., M.B., F.R.C.P.

*Physician in charge of the Dermatological Department, Guy's Hospital.*

HOW often does the dermatologist hear both general practitioners and consulting physicians protest that they "know nothing about skins"! They do not, however, confess to complete ignorance of the stomach, the liver, or the kidneys, although accurate diagnoses of the disorders of such hidden organs are largely dependent upon laboratory tests. The skin, its appendages, and the accessible mucous membranes, on the other hand, lend themselves to direct observation, and provide the mirror in which the eye that has been taught to see can often detect with certainty the nature and cause of a disease which is primarily independent of them. To give but one example, some years ago I was asked by one of my colleagues to see a young girl, who had a most severe pustular rosacea associated with cirrhosis of the liver. So characteristic were the clinical appearances of this unusual rosacea, that I was able correctly to diagnose hepatic cirrhosis in two other patients from the facial condition for which they consulted me.

Admittedly the number and variety of eruptions and functional disorders that may involve the skin are so great that only the specialist can be expected to recognize the rarities; but any student, if he is properly

taught and will take the trouble, can learn to differentiate between the banal eruptions, such as urticaria, eczema, and psoriasis, and to appreciate the essential diagnostic features of impetigo, scabies, ringworm, and alopecia areata.

The reason why the majority of medical men and students find dermatology so difficult is, I believe, partly because they have never learnt to observe, and partly because they have not grasped, first, the distinction between diseases of the skin that are in themselves specific entities and those that are merely cutaneous reactions, comparable to and often associated with morbid symptoms affecting other organs; and, secondly, the relationship of the latter group to general pathology.

It is significant that great clinical physicians, such as Osler, to name but one, have appreciated the importance of the non-specific dermatoses, e.g. urticaria, erythema multiforme, purpura and eczema, in connection with visceral disease, and conversely one of the greatest dermatologists, Louis Brocq, spent his life in emphasizing the *alternation* of certain cutaneous symptoms with those of non-specific disorders of other organs. The chapters on *Les Fluxions et les Alternances Morbides* in his "*Cliniques Dermatologiques*"<sup>1</sup> should be read by every medical student; in them he will find the remarkable personal history of Jean X., which has become a classic, together with notes upon nineteen members of his family. Here in the life of one unfortunate are described nearly all the non-specific "diseases" (better termed symptoms or manifestations) that we now recognize as dependent upon the allergic state—urticaria, eczema, general pruritus, circumscribed prurigo, dermatitis from external irritants, spasmodic rhinorrhœa, asthma, gastro-intestinal disturbances, attacks of gout, rheumatism, neuralgia, migraine, and at times psychological crises, chiefly melancholia with suicidal tendencies. Brocq emphasizes repeatedly the alternation of

cutaneous manifestations with those involving other organs, and the striking influence of diet upon the activity or remission of the various symptoms. Under a strict vegetarian régime with regular exercise these remained more or less in abeyance : on the other hand, a return to his former dietary, which included a large proportion of meat, fish, and eggs, together with alcoholic drinks, invariably caused a recurrence of one or more of his allergic reactions.

This intimate record of a life of suffering affords a fitting introduction to the study of those conditions that Danysz terms " non-contagious chronic diseases," in the etiology of which heredity, individual predisposition, environment, severe acute or chronic infections, and habits of life play so important a part. In the great majority of persons who from infancy are subject to the successive or alternating manifestations of allergy, such as infantile eczema, asthma, urticaria, paroxysmal rhinitis and prurigo, careful questioning will reveal the importance of the hereditary factor. In those in whom there is little or no evidence of any inherited predisposition, an acquired hypersensitiveness may supervene on some grave infective disease or toxæmia, e.g. tuberculosis, syphilis, typhoid fever, malaria, an acute streptococcal infection, and food or drug poisoning ; it may also result from an unhealthy environment and faulty dietary both in childhood and adult life. Two cases of acquired hypersensitiveness to light come to my mind as illustrations :—

One, a healthy man with no previous history of allergic symptoms, had a severe attack of food-poisoning, with violent sickness and diarrhoea lasting three days, on board ship. On the fourth day he left his cabin, and went into strong sunlight on deck. From that time he was light-sensitive. The other, a plethoric man of middle-age, fond of good living, went to Paris with some boon companions, and ate and drank to great excess. He returned to England and played golf on a sunny day the following week-end. He developed an acute eczematous dermatitis of exposed parts, which recurred whenever he went out of doors. When I saw him, his liver was palpable three fingers' breadth below the costal margin, and his urine contained a large quantity of urobilin with a heavy

deposit of urates. With strict dieting and abstention from alcohol his sensitiveness to light gradually lessened.

So much work has been done, particularly in recent years, upon the most obvious and commonest allergic diseases, such as asthma, hay-fever, urticaria, eczema, and rheumatoid arthritis, that we are apt to view the problem from our own particular angle, or, it may be, line of research, and to forget fundamentals. The basis for the proper understanding of chronic non-specific diseases is provided, as Danysz indicates,<sup>2</sup> by the following experiment :—

If a rabbit be injected intravenously with small doses (0.01–0.1 c.cm.) of horse-serum every day, or two or three times per diem, for a period of some weeks, an acute anaphylactic crisis will not, of course, occur, owing to the repetition at short intervals of small doses of the foreign protein, although the animal's serum will contain a large quantity of specific antibodies. Suppose twelve rabbits have thus been treated, and are then kept under observation, two or three months after the completion of the series of injections it will be noted that some will have developed symptoms of involvement of the nervous system (paralyses), others dermatoses with alopecia and prurigo, others arthritis, and at the end of a year the majority will have succumbed to chronic diseases, with subsequent cachexia, comparable to those in human beings.

The points to emphasize in this experiment are :—

(1) That the antigen (horse-serum) injected into each animal was the same; (2) that the animals were of the same species; (3) that, nevertheless, different individuals of the series developed different manifestations of chronic disease according to the particular organs affected in each case—skin, nervous system, joints. In the same way, out of a series of human beings who are, say, sensitive to egg, one will respond to its ingestion by an attack of urticaria, another by sickness and diarrhoea, another by asthma. The comparison is exact, and illustrates the fundamental fact that allergic symptoms are *non-specific as regards the antigen, but specific for the individual affected*, although the same person may exhibit different symptoms with the same or diverse antigens.

Comparable to the effects of the above experiment upon rabbits are those observed in horses submitted to

intensive immunization for the production of antitoxic serums. All sooner or later become ill, and often die of internal hæmorrhage from rupture of the liver (cp. anaphylactic shock in dogs). Petit and Loiseau<sup>3</sup> on autopsy found the following lesions, quoted by Danysz: "Profound modifications in the hæmo-lymphatic organs (e.g. spleen and bone-marrow), which are the site of an acquired hyperplasia; the endocrine glands showed signs of hypersecretion; and there were well-marked pathological changes in the liver and kidneys." Similarly Boughton's well-known experiments<sup>4</sup> on the effects of injecting guinea-pigs with small doses of foreign proteins (egg-white and beef-serum) showed how an arteriosclerosis, comparable to that of man, may be thus produced. Only the smaller arteries were affected, and particularly those of the liver, kidneys, spleen and heart, the pulmonary arterioles being spared.

#### SERUM SICKNESS

From what has been said it is clear that clinical symptoms and pathological lesions affecting different organs, comparable to those occurring in human beings who are afflicted with chronic diseases, may be produced experimentally in animals by the repeated administration of various foreign proteins *parenterally* in small doses. A comparison may now be made with the acute and, as a rule, temporary effects that sometimes result from the therapeutic injections of a foreign serum into a human being. Leaving aside anaphylactic shock, which occurs in sensitized persons, we may briefly summarize the various symptoms of so-called serum sickness:—

(1) *Skin*.—The cutaneous lesions tend to be polymorphic, and to vary in different individuals. They are urticaria, angeio-neurotic cedema, eczema, and diverse erythemata, corresponding to certain clinical types, namely—E. scarlatiniforme, E. exudativum multiforme, E. marginatum, and even E. nodosum.

Purpura may also rarely occur. The buccal and pharyngeal mucous membranes sometimes present a red flush with a varying degree of oedema, which may extend to the glottis.

(2) *Articulations*.—Arthralgia is very common. Effusion into the joints, or more usually a periarticular swelling, involving chiefly the metacarpo-phalangeal and interphalangeal articulations, may be seen with or without a cutaneous eruption. The clinical picture may strikingly resemble acute rheumatoid arthritis.

(3) *Lymphatic glands*.—A localized or generalized adenitis may accompany the serum rash, and in some cases the glandular swelling is the predominant symptom.

(4) *Nervous system*.—The various symptoms indicative of involvement of the nervous system are of great interest. (a) *Psychical*: Depression, excitement, delirium, and convulsions, or prolonged hypnosis, particularly in children. (b) *Meningeal*: These occur only after intrathecal injections, and need not be considered. (c) *Neuritic*: These are rare, but have been studied in detail by several observers. They consist of paralyses, usually of the Duchenne-Erb type, with muscular wasting. Cases with purely sensory symptoms also occur.

(5) *Urinary and other systems*.—Lastly, oliguria and albuminuria are the rule during the stage of active symptoms; hæmaturia is rare. Vomiting and diarrhoea, enlargement of the liver, and pulmonary engorgement may all occur. Thus in serum sickness there is a veritable acute eruptive fever, with an incubation period varying from four to thirty days, the average being eight to eleven, a period of active symptoms with pyrexia, and a period of convalescence. The polymorphic nature of its manifestations is dependent upon the particular tissues that are sensitized, and this in turn, as in the experiments upon animals already referred to, is a matter of individual idiosyncrasy. The importance of serum sickness lies in the fact that, by the injection of a known antigen, we may produce

diverse symptoms, which recall many of the non-specific diseases that occur both in human beings and animals. For the purpose of this article its significance as regards the cutaneous symptoms will alone be considered, but what will be said is, with certain reservations, equally applicable to other non-specific conditions, such as paroxysmal rhinorrhœa, asthma, migraine, rheumatoid arthritis, certain gastro-intestinal disturbances, periodical albuminuria, gout, and probably epilepsy, nephritis, and arteriosclerosis.

#### THE NON-SPECIFIC ERUPTIONS

As an example of a *specific* eruption we may take that of pityriasis rosea. Although the causal organism has not yet been isolated, no one can doubt that this disease is of infective origin, the responsible virus being inoculated at one or more sites on the skin, where it produces the so-called "herald" patches, and subsequently reaches the blood stream. The characteristic generalized eruption is no doubt due to the circulating virus coming in contact with the skin, which by this time has become sensitized by the localized growth of the virus in the herald patches (cp. secondary syphilide, vaccinal exanthem). Slight adenitis may accompany the eruption. The infection lasts for some five to eight weeks, and then dies out; recurrences are very rare. Pityriasis rosea is thus a specific infective disease in which spontaneous recovery occurs. The *médailleurs* of the secondary eruption are pathognomonic and peculiar to the infection.

When, however, we come to consider the non-specific eruptions—urticaria, angeio-neurotic œdema, eczema, erythema multiforme, erythema marginatum, erythema scarlatiniforme, erythema nodosum, the prurigos, and, in my opinion, lupus erythematosus, psoriasis and dermatitis herpetiformis—although the elementary lesions are characteristic, and might therefore suggest, as in pityriasis rosea, a specific causation, a study of



a dozen cases of any one of them makes this view unlikely. No one now doubts that urticaria, angioneurotic oedema, and eczema are merely reactions that may be provoked by very numerous primary causes in a sensitized person, the first being a dermal response, the second subcutaneous, and the third epidermal. But with regard to some of the erythemata and lupus erythematosus, there are many who still presume a hypothetical specific causation. Erythema multiforme of the classical type may appear repeatedly in certain persons as an accompaniment of streptococcal tonsillitis, and may be associated with erythema nodosum, there being sensitization of both dermal and subcutaneous tissues. It may occur, as has been said, in serum sickness, although the majority of serum rashes are constituted by a mixture of urticarial and circinate erythematous lesions. It may constantly follow the ingestion of certain drugs or articles of food in some persons, and one of the most severe attacks that I have ever seen, in which the eruption was of the classical type, was proved to be due to medinal. It may result from general sensitization to a trichophyton fungus, and, in some cases, apparently to the tubercle bacillus.

It might be argued *a priori* that an eruption, which can be provoked by so many and diverse primary antigens, cannot be etiologically specific, but herpes simplex, which may occur in several infective diseases and may follow trauma or the administration of certain drugs, is nevertheless always due to the same virus, whatever the exciting cause may be. It is possible that erythema multiforme, which, by the way, is not infrequently preceded or accompanied by herpes simplex, may in its classical form be due to a specific virus, but the results of experimental investigations and of treatment based upon them do not support this view, and I think that in the present state of our knowledge we are justified in regarding it and the other

clinical varieties of the erythemata, as well as lupus erythematosus, dermatitis herpetiformis, and psoriasis, as non-specific eruptions, comparable to such conditions as asthma, paroxysmal rhinorrhœa, migraine and rheumatoid arthritis.

#### PATHOGENESIS OF THE NON-SPECIFIC DISEASES

How are we to explain the pathogenesis of these non-specific reactions of multiple causation? Why is it that a streptococcal or other infection, an article of food, a drug, or a foreign serum can all produce eruptions as distinctive as urticaria or erythema multiforme? The animal experiments cited, and the study of serum sickness have taught us that one and the same antigen can produce different symptoms in different individuals, and it is thus clear that in the pathogenesis of non-specific morbid conditions the nature of the antigen is of no account, the individual affected is all-important. An interesting confirmation of this was afforded by two sisters under my care, who were homologous twins. They were both subject to recurrent outbreaks of erythema multiforme, which as a rule followed mild attacks of tonsillitis, and often their attacks coincided. In this instance two individuals of identical "make-up" apparently reacted to a streptococcal infection in the same way.

It would seem clear, therefore, that the essential factor determining the nature of a given non-specific reaction is not the primary antigen which provokes it, but the effect of that antigen on the individual's tissues, together with the site at which the reaction occurs. In other words, the sensitized person produces his own particular substance—a secondary antigen—which is the immediate cause of his symptom or symptoms, in response either to one or several primary antigens. This explains why in the majority of patients, suffering from chronic urticaria or eczema of internal origin, it is impossible to discover any specific primary antigen,

e.g. a food substance, responsible for their eruption. Occasionally one encounters persons who develop, say, urticaria only after the ingestion of a given article of food or drug, but this is the exception. In the great majority the attacks occur under the influence of multiple causes—the ingestion of a variety of foods or drugs, emotion, fatigue, exposure to heat, cold or light—which provoke the production of the *autogenous* antigen to which their skin is sensitized.

This conception is of fundamental importance, since it provides the explanation of the pathogenesis of the non-specific diseases under consideration. It explains why disputes occur as to the etiology of those of them in which a certain factor seems to be all-important in some cases, another factor equally so in others. As examples, we may take erythema multiforme, erythema nodosum, and lupus erythematosus, in the causation of all of which conditions the rival claims of a streptococcus longus and the tubercle bacillus have been argued in recent years. The explanation offered is that these eruptions are “type” reactions or, as Darier terms them, *syndromes*, which may be evoked in one group of cases by the action of a streptococcal infection on the tissues, in another by that of the tubercle bacillus.

Our conception of the autogenous antigen explains also why so many etiological factors have been claimed to be causative in such conditions as arterio-sclerosis, chronic nephritis, gout, migraine, Graves's disease, and rheumatoid arthritis. In nearly all these and similar morbid states the hereditary and familial factor is beyond dispute; syphilis, focal infection, abuse of alcohol, diet, worry, shock, cold, and so on—these are but accessory factors, important in some cases, absent in others, which may stimulate in various ways the production of the essential autogenous antigen.

I cannot here present all the evidence in favour of the existence of this autogenous or secondary antigen. It might be deduced theoretically from a consideration

of certain drug eruptions, and from the fact that in many cases of chronic allergic diseases it is impossible to detect any responsible primary antigen.

I propose merely to indicate certain observations that suggest this view :—(1) That a person may become sensitized to some product arising from his own damaged tissue is now accepted by most English dermatologists. Whitfield<sup>5</sup> described cases illustrating this auto-sensitization, for example after severe bruising :—

One was a lady, who developed a hæmatoma without breach of surface on the skin after a blow from a cricket-ball. Ten days later a generalized erythemato-urticarial eruption, resembling that of serum sickness, appeared. Another case was a lady who fell downstairs, producing a severe bruise on her left wrist. *After the same incubation period*—namely, ten days, which corresponds to that usually observed in serum sickness, a similar eruption occurred.

I have seen comparable cases, and the phenomenon is not very uncommon after operations involving extravasation of blood, such as amputation of the breast. It should be noted that in these cases the eruption is of the erythemato-urticarial type, and that there is a definite incubation period between the trauma and the appearance of the eruption.

More recently Whitfield<sup>6</sup> in a very significant communication draws attention to this phenomenon of auto-sensitization in eczema. He cites the case of an elderly man, who had an acute vesicular eczema of both legs and a mild attack of gout. If the serum from the eczematous vesicles was allowed to flow over an area of normal skin, there appeared, first, “a red streak, secondly, after a few minutes, a well-marked urticarial wheal, and, lastly, a row of vesicles, at first minute and clinically indistinguishable from the primitive vesicles of eczema, but subsequently coalescing to form a linear bulla.” On Whitfield’s own skin, however, the serum produced no reaction, thus proving that the patient was sensitive to the serum containing his own tissue-products, but that it was innocuous to another person.

Whitfield then describes an occurrence with which all dermatologists are familiar, namely, the development of a generalized and usually strikingly symmetrical eruption of papulo-vesicular eczema after a chronic patch of lichenified eczema, as a rule on the leg, has been violently scratched, or when a varicose eczematous dermatitis has been irritated by unsuitable local applications. The generalized eruption is presumably due to auto-sensitization having taken place to some tissue-product absorbed from the primary eczematous area, and, when the latter is treated by soothing applications, the former disappears spontaneously without treatment. Whitfield also remarks that he has met with many cases of nurses who have developed true eczematous lesions, beginning on the hands, wrists, and forearms, and spreading to other parts, after the *prolonged* dressing of cases of exudative eczema, the possibility of antiseptic irritants having been excluded; thus indicating that the nurse had become sensitized by *repeated* contact with the patient's serum. Finally, he explains the development of the generalized exfoliative dermatitis, which occasionally results from treatment of eruptions, such as psoriasis, by irritants, e.g. chrysarobin, as being due to auto-sensitization to the patient's own tissue-products.

These observations are of the greatest importance, and, in this connection, the case of a young girl recently under my care for an eczema of apparently internal origin, chiefly localized to the arms, may be mentioned; the eruption was being aggravated by violent scratching, and, in order to obviate this, I enclosed her arms in occlusive bandages. Forty-eight hours later on removal of the bandages the eczema on the arms had become acute and vesicular, though not pustular, and there had developed a widespread eruption consisting partly of characteristic *erythema multiforme*, and partly of a papulo-vesicular eczema. Here, presumably, the occlusion of the primary eczematous areas had led to the absorption of, and auto-sensitization to tissue products, which produced the polymorphic eruption.

(2) From the above observations it may be concluded that persons may become sensitized to some substance derived from their own *damaged* tissue or effused blood,

and that the serum from an acute vesicular eczema may contain a product which is not only capable of provoking an immediate eczematous reaction on the unaffected areas of the patient's own skin, but to which another person's skin may in time become sensitized by repeated contact. This being so, it might naturally be expected that the tissue-damage caused by acute bacterial infections, or by toxic substances, for example, certain drugs, might also lead to the formation of substances to which sensitization might develop. Many clinical observations tend to confirm this hypothesis. Moreover, Avery<sup>7</sup> has shown that in pneumonia a substance is excreted in the urine to which positive skin-tests are given by the patient. With regard to drugs, Oriel<sup>8</sup> records the case of a patient, in whom the ingestion of even minute quantities of aspirin caused angeio-neurotic oedema. He gave negative skin-tests to aspirin, and to his own urinary "proteose" isolated when he had not taken aspirin; the "proteose" prepared from the urine after the ingestion of aspirin, however, gave positive skin-tests both in him and in other aspirin-sensitive persons. This suggests that, in certain people, aspirin calls forth the production of a substance to which sensitization may occur. The same is doubtless also true of a large number of other drugs, e.g. iodine, quinine, the antigen not being the drug itself, but a product of the action of the drug on the patient's tissues.

(3) Lastly we come back to the chronic non-specific diseases, which appear in human beings, so to speak, spontaneously. There are some, like Jean X. (*vide* p. 210) who by heredity, or some individual peculiarity, are excessively prone to become sensitized, often to several primary antigens (animal emanations, plants and their pollens, food-stuffs, drugs, etc.), and to exhibit multiple symptoms of the allergic state—paroxysmal rhinitis, asthma, urticaria, eczema, prurigo, migraine, and gastro-intestinal disturbances. There

are others, in whom no such inherited or acquired tendency to multiple sensitization is apparent, but who develop, sooner or later, some chronic morbid condition, such as rheumatoid arthritis, eczema, psoriasis, or migraine, without any primary cause being necessarily discoverable.

We have seen how in animals similar conditions may be produced experimentally by the *parenteral* injection of foreign proteins, which act as primary antigens, and how in human beings similarly the introduction of a foreign protein or a drug parenterally by injection, may lead to various symptoms of sensitization. In the case of animal emanations, plants, pollens, chemical irritants, drugs, and bacterial infections, the route of access of potential primary antigenic substances may also be parenteral, *via* the mucous membrane of the nose and throat, the bronchial tubes, and the skin. But probably in the majority of cases the route is via the alimentary canal.

In normal persons in perfect health the absorption of potentially antigenic *protein* substances from the alimentary tract into the general circulation probably does not occur, for even if they pass the intestinal barrier, they are fixed and altered by the hepatic cells. If, however, the digestion of proteins is incomplete or delayed, owing, for example, to hypochlorhydria or pancreatic insufficiency, if the intestinal mucosa be abnormally permeable, and if the proteopexic function of the liver fails, the absorption of protein substances, capable of causing sensitization of the various tissues, can occur. We have also to consider the absorption of bacterial antigens from the gut, and the direct toxic action of these, or of the products of bacterial decomposition of undigested protein on the liver cells.

As emphasized elsewhere,<sup>9</sup> I believe that functional insufficiency of the hepatic cells is the most important factor in predisposing to sensitization towards antigens absorbed from the gut, and in some cases to those of

parenteral origin. I believe, further, that the secondary autogenous antigen to which sensitization may occur, with the production of the various symptoms under consideration, is probably the result of damage to the hepatic cells by diverse primary antigens, when such are absorbed from the gut, and by toxic substances, such as arsenical and other metallic compounds, when introduced parenterally by injection. This secondary autogenous antigen would thus correspond to the secondary antigen, or anaphylotoxin, derived from the liver, which Mainwaring considers to be the direct cause of anaphylactic symptoms in sensitized dogs. The excretion of this secondary antigen in the urine in conditions of sensitization, as Oriel's work would seem to prove, is not only of great scientific interest, but is also of importance from the therapeutic standpoint. Desensitization of an allergic subject by injection of presumed primary antigens is often impracticable or unsuccessful, whereas the isolation of a person's own secondary antigen, and its employment as a specific desensitizer offer a resource which our experience has already shown to be invaluable.

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# Pruritus

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THERE is much ambiguity in the use of this term. It is often regarded as being synonymous with the sensation of itching, which is the accompaniment of a large number of skin diseases. In the following article I propose to restrict the term to the cases in which the subjective sensation of itching is the sole, or at any rate the first, symptom of disorder, that is to say, itching not preceded by lesions of the skin. This restriction is a matter of clinical convenience, and it is obvious that individual cases may pass from this category to various classes of skin diseases as later symptoms develop.

Cases of pruritus used in this sense may be roughly divided into two classes, those attributable to internal and those attributable to external causes.

## INTERNAL CAUSES

Inasmuch as by the definition offered we have to deal primarily with a subjective sensation, the make-up of the individual is of essential importance in determining the measure of the discomfort suffered. Nervous, highly-strung, and tired persons are more likely to have excessive reaction to the symptom than the stolid type, and the neurotic group is one of the largest of the sub-divisions of internal causation. Women suffer more frequently than men, and certain clinical classes may be distinguished.

(1) *Hysterical pruritus*.—This is found in quite young girls and is marked by frenzied scratching, resulting in mutilating excoriations in which portions of the surface are literally “dug out” by the nails. The disease may occur, but much less commonly, in older

women about the menopause. There are usually other symptoms of hysteria, notably anæsthesia of the soft palate and of the cornea. Scratching aggravates the itching, and means of controlling the hands are essential. It may be advisable to keep the patient in bed for a time under careful observation until the habit is broken and the patient is convinced that she is needlessly hurting herself.

(2) *Nevrodermite*.—This type occurs usually in middle-aged women, certain parts of the body being particularly affected, such as the nape of the neck, the labia, perinæum and thighs. Itching is often the first and occasionally the only symptom, but circumscribed areas of the skin in these regions may become altered by the prolonged scratching, discoloration and induration being the principal changes brought about.

The application of X-rays to these patches will usually relieve the itching and the induration, but the inadvisability of giving repeated doses of X-rays has been burned into our generation by the deplorable frequency of epithelioma in patches so treated, and my own practice is to avoid application of X-rays for this condition until other methods have failed. For long-standing cases (which are just the type for which X-rays are used) I have found great benefit from the following method of treatment. The part affected is swabbed every five days with the following lotion, which is allowed to dry after painting :—

R	Phenol	-	-	-	-	-	3j
	Glycerini	-	-	-	-	-	3j
	Liq. carbonis deterg.	-	-	-	-	-	3j
	Aq. ad	-	-	-	-	-	3ij

Ft. lot.

In the intervals between its application a calamine lotion may be used several times a day.

(3) A rare but well-defined group of cases may be mentioned, in which the pruritus is really the disordered memory of a past affection, a mental rather than a physical state, found in some persons who may have

contracted a parasitic disease, such as scabies, and in whom the horror is so great that the itching may remain long after the parasitic cause has been eliminated. Success may sometimes be attained by suggestion; and it may be useful, for example, to apply an ointment and to give instructions for disinfection of the clothes—measures which will frequently persuade the patient that her disease, even if it had been imaginary, has been eradicated. Cases of this kind really suffer from the *idée fixe* form of insanity and often drift into asylums.

(4) There is probably a definite class of senile pruritus, usually ascribed to changes produced by old age in the skin, especially its increased dryness, but the very frequent occurrence of pediculosis in old and neglected people should be borne in mind and this cause carefully excluded before ascribing the symptoms to senility.

(5) An obscure class of cases may be mentioned of persons who suffer from what may be called an "excitable" skin, in which moderate friction or pressure will produce exaggerated lesions. This symptom, known as "dermo-graphism," is usually accompanied by itching, which may be intolerable in degree. A course of calcium lactate and parathyroid sometimes gives relief. In exacerbations severe enough to cause loss of sleep hypodermic injections of adrenalin (10 to 15 minims of 1 in 1,000 solution) is the best means of procuring at least temporary alleviation.

(6) *Toxic pruritus*.—Pruritus is a prominent symptom of various general diseases: e.g. diabetes, gout, hepatic affections, Graves' disease, the complex known as asthma-prurigo, gastro-intestinal fermentation, visceral carcinoma, malaria and nephritis. Of recent years increasing attention has been directed to the pruritus which often accompanies focal sepsis. The state of pregnancy may be associated, especially in its later phases, with a general pruritus.

Under this same heading ought perhaps to be included the pruritus following upon the ingestion of certain foods and drugs. Much attention has been given recently to the large group of cases which seem to be due to special idiosyncrasies or sensitizations, especially in the asthma-prurigo class, in which inheritance seems to play a considerable part.

General pruritus may be the first symptom of a number of diseases, the nature of which is only demonstrated when characteristic eruptions or other manifestations occur, such as dermatitis herpetiformis; lichen planus; the serious affection known as lymphogranulomatosis, the diagnosis of which is usually possible only when lymphadenoma develops; mycosis fungoides, in which also the diagnosis can seldom be made until the characteristic lesions of the skin appear. The treatment of this preliminary pruritus can only be symptomatic, until further characters develop, when the measures appropriate to the particular disease thus demonstrated to be present must of course be followed.

#### EXTERNAL CAUSES

In this group the symptom of itching is most commonly the result of a parasitic disease, the presence of the parasite being overlooked. Pediculosis, scabies and ringworm are the three chief categories of a missed parasitic infection. The position of the itching will often provide the diagnosis. The itching of *pediculosis* is usually most prominent about the shoulders and back; the itching of *scabies* is more general and is always decidedly worse at night, the activities of the parasite being nocturnal. Of late years the part played by *ringworm* infections in producing intense itching has become very much more widely realized. Recent observations demonstrate that a ringworm restricted to quite a small area, such as the toes, may produce, by toxic absorption, a general skin eruption, simulating

certain well-marked diseases of the skin, and the toxicity of the fungus, previously unsuspected, is thus incontestably proved. Itching about the thighs, scrotum and perinæum should always suggest the search for ring-worm fungus. A small group of cases of pruritus can be perhaps ascribed to extreme sensitiveness of individual skins to heat or cold, and to contact with rough textures such as wool.

*Pruritus ani*, which is sufficiently frequent to deserve a mention apart, is much more commonly due to the presence of thread-worms than is at all frequently realized. It may, however, be caused by portal congestion due to hepatic disease or local obstruction from tumours in the pelvis and from pressure of the uterus in the later stages of pregnancy. Prolonged constipation, revealed by the passage of scybala, is a fruitful contributory cause. When actual lesions of the surface, e.g. fissures or secondary eczematization have become apparent, local treatment for these conditions may be required.

*Pruritus vulvæ*.—The same considerations as have been named above largely apply, but here uterine or vaginal discharges may be a probable cause.

#### TREATMENT

It is obvious from the consideration of the multitude of causes which may produce pruritus that scientific treatment must rest upon identifying, and if possible eliminating, the source of the trouble. Certain general considerations should, however, be kept in mind. The symptom is almost always worse at night, probably because of the increased warmth of the body in bed. It is an obvious precaution to lessen the artificial heating from the clothes as far as this may be possible. Scratching, while it seems to relieve the patient temporarily, makes matters worse; indeed the results of scratching are not the least important part of an unchecked pruritus; secondary septic infections

produced by dirty nails may convert the case to a serious aspect. Areas of the skin which have been subjected to prolonged itching and scratching usually undergo pathological changes, very well illustrated in the objective eruptions described above which so often accompany the "nevrodermites." Means of protecting the skin from the action of the hands must be devised, either by wearing thick gloves, or by improvising a cardboard splint at the elbow which prevents the hands from getting at the body.

It is noteworthy that the sensation of itching often yields to the sensation of pain, and pain is in fact preferred to itching. The method of applying counter-irritants probably acts by thus substituting pain for itching; scratching to the degree of producing excoriation doubtless relieves itching in the same way.

The nervous group of cases is best treated by nerve sedatives. Habits of scratching, like habits of sleeplessness, must be broken if possible by a course of drug-taking which checks the paroxysm for a sufficient time to deaden the habit. In women suffering from the menopause modern methods of accelerating the cessation of menstruation by radium are well justified.

In the large group of toxic cases, the general causes producing the toxicity must be attacked. Intestinal stasis is so frequent and, if not the essential cause, is so mischievous in aggravating the symptoms, that it is well, as a routine measure in cases of pruritus of unknown origin, to investigate whether stasis is present by methods such as the bismuth meal, or more simply by the administration of charcoal and observation of the period of its retention. Where stasis is thus demonstrated it is important to treat it. One of the simplest and most practical methods is by the combined fast and purge treatment, first devised by Guelpa, which has been found so useful in diabetes. On the morning of the day set apart for the treatment the patient should take an ounce to an ounce and a half of Glauber's

salts in a pint of warm water, and during the whole of the day, but particularly during the earlier hours, as much liquid as can be managed should be taken. Any liquid with no food value is permissible, such as tea without milk, orange juice, etc., or plain cold water. During the whole of the day no food at all should be taken but the following morning the ordinary diet may be resumed and adhered to until the day of the next treatment, and no alteration in the ordinary diet need be made at all. Where Plombières douches are available these are a valuable adjuvant.

The commonest sites of focal sepsis are probably the teeth and the tonsils, which should consequently be inspected in every case of unexplained pruritus and faulty conditions dealt with *secundum artem*.

Where sensitization to food stuffs is suspected there are now upon the market means of testing groups of substances likely to produce such sensitization, and where a positive result is obtained valuable help may be afforded in identifying the noxious agent and removing it from the dietary.

It will be obvious from the preceding remarks that adequate treatment for pruritus calls chiefly for general measures rather than local. When, however, the causes of the symptom cannot be ascertained, and that unhappily is frequently the case, symptomatic treatment is required.

The number of local remedies in use for checking pruritus is in itself an indication of the difficulty of controlling that symptom when the cause is not ascertained. The most usually successful agents may be summarized :—(1) The application for a few minutes of compresses so hot that they can only just be borne, followed by dusting with an inert powder, is a very useful measure. (2) Certain chemical substances appear to alleviate itching, temporarily at any rate. The most valuable of these is carbolic acid applied either in the form of a lotion or an ointment in strengths of 1 to 2 per

cent. Dilute hydrocyanic acid is also much used, either as a lotion or an ointment. Camphor, 1 to 3 per cent., has a moderately antipruritic effect. Menthol is anæsthetic as well as antipruritic, and where pruritus is accompanied, as it not infrequently is, by actual smarting or pain, menthol is indicated in strengths of 1 to 10 per cent. I have had some satisfaction from the use of Bayer's cycloform ointment, 10 per cent. The addition of ichthyol (1-3 per cent.) to lotions or ointments increases their antipruritic effect. Weak preparations of tar are among the simplest and best applications. A favourite prescription of mine is:

R	Lot acid carbol. (1 in 80)	-	-	3j
	Liq. carbonis deterg.	-	-	ʒ xv.
	(1 to 6 per cent.)			

Ft. lot.

The addition of cocaine is often advised, but its expense and the dangers of improper use seriously restrict its prescription. (3) Finally, one may recommend the resort to spas, where the environment more particularly helps the patient, who is usually obliged to undergo dietetic restrictions, to follow regular hours for eating and sleeping, and is deprived of occasions of excitement or strain which so materially aggravate the symptom of itching. The advantage of spa treatment is to be explained, in my opinion, more upon these general lines than upon baths or other local treatment which is as a rule of quite secondary importance.



# X-ray Treatment of Skin Diseases

By A. M. H. GRAY, C.B.E., M.D., F.R.C.P., F.R.C.S.

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WITHIN a year or so of the discovery of X-rays by Roentgen in 1895, this powerful agent had been used in the treatment of certain forms of skin disease. In the earlier years attention was chiefly focussed on the action of the rays in superficial malignant disease but later other types of dermatosis were found to respond favourably to treatment. In the years which have elapsed since that date, not only has the apparatus for producing the X-rays vastly improved, but the experience of a generation of dermatologists has placed X-ray therapy on a firm basis.

*General considerations.*—It is not proposed in this short article to discuss either the physical or technical side of X-ray therapy, except to say that it is now possible by means of the hot cathode tube, first devised by Coolidge in 1914, to produce rays of uniform quality, so that risks entailed by the use of the older forms of apparatus have been largely eliminated.

*Dosage.*—In dermatology, as in no other branch of medicine, is extreme accuracy in X-ray dosage necessary. It was found out quite early that X-rays had the power, in certain doses, of causing epilation. It was also found, if the dose was given within certain narrow limits, that the hair grew again after epilation, but if that dose was exceeded the hair did not regrow. Sabouraud and Noiré in 1904 developed a method of using this property of epilation by X-rays to treat cases of ringworm of the scalp, and, in order that the dosage

should be accurate, they devised small discs or pastilles of platino-cyanide of barium which, when placed in the path of the rays, turned from a lemon yellow to an orange tint. Two standard tints were prepared, "tint A," which corresponded to the colour of the pastille before exposure, and "tint B," which corresponded to the colour after an epilating dose had been given, provided the pastille had been placed midway between the anti-cathode of the X-ray tube and the skin and certain other conditions had been fulfilled. These pastilles came into common use for measuring dosage and are still employed in many countries, though various other methods have been devised, and an epilating dose has come to be known as a "pastille dose." It has been found that an epilating dose, if applied to the skin on the flexor aspect of the forearm, will usually produce a slight erythema and it is therefore sometimes spoken of as an "erythema dose." In the United States, largely under the influence of MacKee, with the modern apparatus available and using certain definite standards, this biological method of testing dosage is largely employed and this slight erythema dose has come to be called a "skin unit," which is used as the standard measurement of dosage. Whether, therefore, we use the term "pastille dose" or "skin unit," we are referring to the same thing.

*Dangers.*—Apart from the question of causing permanent alopecia from an excessive dose given to the scalp, it must be remembered that very considerable damage can be done to the skin either by a single overdose or by too frequent repetition of small doses. In the former case, varying degrees of erythema can be produced, extending in the more severe cases to blistering and ulceration of an extremely indolent and painful character; while, in the latter case, atrophy of the skin may be set up with pigmentation and telangiectases, which is not only extremely disfiguring but very prone to lead to subsequent ulceration and

epitheliomatous changes. It is therefore of great importance that in treating any condition, not only should the individual doses be accurate, but the course of treatment should be arranged so as not to overstep the danger limit.

We now turn to consider some dermatological conditions which respond satisfactorily to X-ray therapy.

*Ringworm.*—The value of X-ray treatment of scalp ringworm has given rise to the impression in some quarters that this method can be used for treating ringworm in any part of the body. This is, of course, not so. X-rays do not kill the ringworm fungus but act merely by bringing out hairs which are affected by the disease, and in which it is difficult to reach the fungus with ordinary anti-parasitic remedies. It is therefore only in ringworm of the scalp and beard in which X-rays are used as a rule. It is also usually unnecessary to employ X-rays in the suppurating ringworms of the scalp (kerion) and beard, as in these cases the affected hairs are loosened by the disease and can easily be removed by manual epilation. In this country, however, some 95 per cent. of scalp ringworm is of the non-suppurative variety and for these X-ray treatment is the most suitable.

It is usually advisable to epilate the whole scalp, even though the disease appears quite localized, as the tendency to spread is very great and if a local area only is epilated, treatment of further patches is made more difficult. Uniform epilation of the whole scalp is readily performed by the method originally devised by Kienböck and improved by Adamson. Space does not permit a detailed description of the method but it consists essentially of marking out on the scalp five points, three in the middle line and one in each temporal area, each five inches from one another, and the exposures are arranged so that the central pencil of rays strikes the scalp at these points and that this

pencil of rays at each point is at right angles to those at all neighbouring points. A single unfiltered "pastille dose" is given to each point and the overlap from each exposure is sufficient to give uniform irradiation of the whole scalp. In a case so treated the hair begins to fall about the eighteenth day and is complete in just over three weeks. In a certain proportion of cases a slight erythema associated with itching may occur towards the end of the first week and should be treated with sedative lotions. If no reaction has occurred by the middle of the second week, an antiseptic ointment such as Whitfield's should be smeared over the scalp daily after washing with soap and water.

Rx	Acid. benzoic.	-	-	-	-	-	grs. xxv.
	Acid. salicylic.	-	-	-	-	-	grs. xv.
	Ol. lavend.	-	-	-	-	-	℥ iv.
	Paraffin. mol.	-	-	-	-	-	3 ii
	Ol. cocois nucis ad	-	-	-	-	-	5 i

A light linen cap should also be worn until cure is complete. After epilation the scalp is examined at frequent intervals, if possible by the mercury-vapour lamp and a Wood's glass filter, by means of which any infected stumps can be seen, owing to their fluorescence. These can be removed by forceps and when the scalp is quite free the patient can be passed as cured. It is possible to get a very high percentage of cures in skilled hands.

In ringworm affecting the hairs of the beard, X-rays may also be used, but satisfactory epilation is not such a simple process owing partly to the irregularity of the surface to be treated, and partly to the bigger dose necessary to produce epilation in the beard hairs with the consequent tendency to produce an unpleasant erythema. It is better in such cases to give smaller doses, such as one-third of a pastille given twice a week for four doses. If at the end of three weeks the hair has not epilated, two or three similar doses may be

given provided no reaction is produced.

It has been pointed out above that X-rays are only a specific cure for ringworm of the hairy regions, but in a certain number of eczematoid ringworms and in ringworm of the nails X-rays may be used as an accessory treatment as will be described when dealing with eczema.

*Sycosis barbae*.—Folliculitis of the beard region due to staphylococcal infection may sometimes require epilation to effect a cure. The same difficulties arise as described above in the case of ringworm of the beard and other methods should first be tried. Small doses, such as one-third of a pastille, given at weekly intervals for three or four doses, if combined with other methods, such as manual epilation and mild local antiseptics, will sometimes effect a cure without epilation. In very persistent cases permanent epilation may offer the only hope of a cure and here the production of permanent atrophy with telangiectases is almost certain. Therefore very serious consideration must be given before embarking on such treatment.

*Hypertrichosis*.—This condition is mentioned in order to condemn its treatment by X-rays. In a large number of cases superfluous hair has been removed by X-rays with disastrous results. In order to cure the condition and cause permanent epilation, doses have to be given which cannot avoid damage to the skin cells, and no technique has yet been devised to obviate this difficulty. The treatment is given purely for cosmetic purposes, and to run the almost inevitable risk of producing a telangiectatic scar renders the procedure entirely unjustifiable.

*Hyperidrosis*.—Excessive sweating in the axillæ, palms and soles, is occasionally so severe as to render the patient's life miserable. X-rays afford a suitable means of treating such cases, as the cells of the sweat glands are specifically acted upon by X-rays. Small doses cause only temporary relief, but slightly larger

doses cause definite permanent diminution in sweating. It is necessary to avoid producing too great dryness by excessive dosage. All the areas mentioned above are rather sensitive to X-rays and an erythema is easily produced, therefore large doses should not be given. MacKee recommends half to three-quarters of a skin unit to be given monthly, from four to six treatments generally being sufficient.

*Acne vulgaris*.—This is an inflammatory condition associated with the large sebaceous glands of the face, chest, and back, and is seen in adolescents in various degrees of severity. For the milder punctate and papulo-pustular varieties, other methods are usually quite sufficient, but for the more severe cases associated with a tendency to scar formation and especially for the deep nodular variety, X-rays are valuable as they cause a rapid disappearance of lesions and tend to diminish the disfigurement produced by scarring. It is, of course, necessary, on the face especially, to avoid any risk of atrophy, and therefore everything must be done to prevent an erythema. Small doses are advisable, such as one-third of a pastille given weekly for four weeks, and then repeated after an interval of six to eight weeks. Intervals are advisable as the action of the rays is slow and continues for some time after the dose is given.

*Eczema*.—So far we have dealt with affections of the hair and glands of the skin. We now consider a group of superficial dermatoses. Considerable difference of opinion exists as to what should be included under the name eczema, but, for the purpose of this article, we include not only those cases whose etiology is obscure, but also all cases of superficial dermatitis produced by known irritants, such, for example, as occupational dermatitis. X-rays are of little value in the acute stages of eczema and frequently make the condition worse; their use is especially indicated in localized chronic types which have failed to respond

to other remedies. For such cases one-third of a pastille is the most useful unit dose to work with. One scarcely ever sees any reaction with this dose and three or four such doses, given at weekly intervals, will generally clear up a chronic patch of eczema. One must, however, be prepared for recurrences, and although a repetition of the treatment once or twice may be justified, if further recurrences occur, this form of treatment should be abandoned. In chronic dry eczema of the palms and soles with hyperkeratosis, X-ray treatment is one of the most valuable remedies, and in these cases more than one course may be necessary to remove the trouble, owing to the thickness of the horny layer, which cuts off some of the radiation. Here, as with acne vulgaris, intervals between the courses are advisable. Certain cases of vesicular eczema of the hands and feet, the so-called cheiropompholyx, respond well to fractional doses of X-rays, even those cases which are associated with dermatomycosis.

*Psoriasis*.—A very small dose of X-rays, about half of a pastille, is often sufficient to clear up a patch of psoriasis, but recurrences are common. For this reason caution should be exercised in the type of case treated. For extensive cases X-rays should not be used, but for small localized patches one-third of a pastille may be given on two or three occasions. As with eczema, psoriasis of the palms and soles, which are difficult to treat by other methods, respond well to X-rays.

*Lichen planus*.—Circumscribed chronic patches of lichen planus respond to X-rays in the same way as psoriasis patches.

*Pruritus*.—Localized pruritus associated with chronic friction dermatitis, which is named lichenification, responds well to X-ray treatment. Various types are seen, the symmetrical type occurring chiefly in children in the bends of the elbows and knees, called Besnier's

prurigo; the type seen at the back of the neck in women; and the isolated patches occurring on the limbs; all these respond well to treatment given on the same lines as for eczema.

Pruritus ani is due to a variety of causes, but for the so-called essential cases, in which no cause can be assigned, X-ray treatment is of great value and frequently produces a permanent cure. Fractional doses as for eczema can be given or a single pastille dose. Pruritus vulvæ may be treated in the same way, if other causes have been dealt with, but the prognosis is not so good in these cases.

*Erysipelas*.—Small doses of X-rays have been found of great value in treating cases of erysipelas. Usually the affected area is irradiated with one-third of a pastille dose, and if extension occurs the dose is repeated in two days. A third dose can be given if necessary. A considerable number of cases respond to a single dose.

*Lupus vulgaris*.—At one time lupus vulgaris was extensively treated by X-rays, but it has been found that patches can only be cured with a large number of treatments, and it is believed that this tends to the formation of epithelioma, so this form of treatment has been largely abandoned. Small doses are, however, useful in combination with Finsen treatment.

*Mycosis fungoides*.—The cause of this curious disease in which numerous granulomatous tumours develop over considerable areas of the body is still unknown, and other forms of treatment have failed to influence its course. If left alone, it terminates fatally. X-ray treatment of the lesions, however, causes their temporary disappearance, and patients can be made comfortable and kept alive for considerable periods. Small doses are most suitable for ulcerating lesions, but, for the less prominent tumours, a full pastille dose may be given when required.

*Tumours*.—Radium has largely replaced X-rays in



the treatment of superficial malignant tumours, but, for certain benign growths, X-rays still hold a place.

*Verrucae*.—For the ordinary warts on the hands, CO<sub>2</sub> snow or diathermy are probably the most useful methods of treatment, but, for multiple flat warts, X-rays are frequently used. A single pastille dose to a group of flat warts will usually suffice to clear them up. If larger doses are required, then each wart should be carefully screened off to protect the surrounding skin. X-rays is the method of choice for isolated plantar warts and can also be used for multiple warts, though the treatment is more difficult. In the former case, the wart is isolated by cutting a hole a little larger than the wart in lead rubber and a dose of one and a half pastilles is given. This dose is repeated in a month unless the wart is quite small, when it usually shells out in that time. If there are a number of small warts in the neighbourhood a single pastille can be given to the whole area, and the larger warts treated again with one and a half pastilles in a month's time, the rest of the skin being carefully protected.

*Keloid*.—Keloids are probably most commonly treated by radium, but X-rays can be used. The skin round must be carefully protected and three-quarters of a pastille given monthly till the keloid disappears; not more than about 12 treatments should be given.

*Rodent ulcer*.—Here, again, radium is used more frequently than X-rays. It is essential in treating malignant new growths that the doses should be large and destructive, otherwise the growth will be accelerated. Adamson recommends scraping away the growth with a sharp spoon and, after carefully protecting the surrounding skin, giving six pastille doses at one sitting to the affected area. MacKee advises doses varying from 1 to 4 skin units, repeated

when the reaction has subsided on four to six occasions if necessary.

*Squamous epithelioma.*—Small skin epitheliomata may be treated in the same way as for rodent ulcers, but it is better to treat with radium.

*Conclusion.*—The foregoing is a short survey of the types of cases which respond favourably to X-ray treatment; a number of less common diseases in which this form of therapy can be used have not been mentioned. It may be worth mentioning that certain conditions which one might think would respond to X-rays, such as lupus erythematosus, exfoliative dermatitis and pityriasis rubra pilaris, do not do so at all satisfactorily. It may also be noted that none of the congenital tumours, vascular nævi, moles, linear nævi or ichthyosis hystrix, should be treated with X-rays, as their disappearance can only be accompanied by dangerous atrophy of the skin.

In dermatological practice X-rays are mostly given unfiltered; for malignant growths, however, some workers prefer to filter out some of the softer rays by varying thickness of aluminium. As the practice varies with different workers, it is difficult to lay down rules on the subject, and readers are referred to larger works, as they are for more detailed technique.

# Radon in Dermatology

By A. C. ROXBURGH, M.A., M.D., F.R.C.P.

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THIS article is intended to call the attention of readers of THE PRACTITIONER to the advantages possessed by radon over radium for use in the treatment of certain lesions of the skin both innocent and malignant. I had used radon in brass and silver tubes and glass applicators for a few cases of angiomas, keloids and rodent ulcers early in 1930, but after hearing R. T. Brain read a paper in June 1930<sup>1</sup> on the use of radon in seeds, I changed over to the use of seeds, and since then have used them in the following seventy-five cases in hospital and private practice:—6 keloids; 3 cavernous angiomas; 4 sub-ungual warts; 52 rodent ulcers; 9 squamous epitheliomata; 1 small non-pigmented mole. The results have been extremely satisfactory, except in the case of the mole, which was quite unaffected.

Although little more than twelve months have elapsed since I began to use the seeds in malignant growths and it is therefore too soon to speak of permanent cure, yet in three cases of keloids which had resisted previous treatment by X-rays, in nine cases of rodent ulcers which had failed to disappear after previous applications of X-rays or radium plaques (beta rays), and in two rodent ulcers and two squamous epitheliomata which had recurred after surgical excision, the growths disappeared promptly after the insertion of radon seeds. These results are probably due to the fact that, the seeds being left *in situ* for seven days, the growth is subjected to a small quantity of almost pure gamma radiation for a prolonged period. This appears to be more effective than a large intensity for a short period, even though the total dose in milligramme hours may be the same.






*Physics of radon.*—Radon is the first degradation

product of radium on its journey towards lead, and all "radium" treatment is equally treatment by radon, for the effective beta and gamma rays used in radium treatment come, not from the radium itself, but from its degradation products radium B and radium C, and all the atoms of radium have to pass through the stages of radon and radium A before becoming radium B and radium C. The only practical difference between treatment by radium and by radon is that in the former case the supply of radon is being replenished by the radium as fast as it is used up, whereas in treatment by radon the amount present is always diminishing, but at a known rate which can therefore be allowed for.

The loss of one alpha particle (charged helium atom of atomic weight = 4) from the radium atom leaves radon or radium emanation, the heaviest gas known, which after a few days fills any closed container in which the radium is placed. The loss of further alpha particles results in the formation progressively of radium A and radium B, while the loss of beta and gamma rays accompanies the change into radium C. Radium A, B, and C form a solid deposit on the walls of the container and constitute the "active deposit of short life." Radium C is converted into radium D which, with its degradation products E and F, constitutes the "active deposit of long life." The next stage, radium G, is lead. The early transformations of radium may be represented as follows (*see overleaf*).

The "half-life-period" is not half the total life, but is the life of the first half of the quantity originally present, i.e. the time taken for the radon to decay to half its original amount. The rate of decay becomes progressively slower as the amount present is reduced, so that the total life is very long, but for practical purposes radon may be taken to have decayed completely in one month. It has not really done so, however, for very small amounts of radiation continue

to come off from the active deposit of long life radium D, E, and F.

Emission	Alpha	Alpha	Alpha	Beta Gamma	Alpha Beta Gamma
					
Atomic weight.	226	222	218	214	214
Name.	Radium.	Radon.	Radium A	Radium B	Radium C
Half life period.	1,600 years.	3.825 days.	3.05 minutes.	26.8 minutes.	19.7 minutes.

Radon can be pumped off from a solution of a radium salt and can be enclosed in small capillary glass tubes or "seeds," or in larger tubes or flat glass bulbs as required. When radon is first pumped off it is free from active deposit and therefore its radiations are weak and it can be handled with comparative safety. After  $3\frac{1}{2}$  hours its radiation is at a maximum, owing to the formation and deposition on the walls of the tube of radium B and C. Thereafter its activity gradually falls off until it reaches half value in 3.825 days. The amount of radon in equilibrium with one milligramme of radium is called a millicurie, and at normal temperature and pressure only occupies a volume of 0.0006 cubic millimetre. A very large number of millicuries therefore could be contained in a small capillary tube and used as a very powerful source of radiation.

The dose of radon is measured as millicuries destroyed or as the equivalent number of milligramme hours. Radon decays at the rate of 0.75 per cent. in one hour, 16.6 per cent. in twenty-four hours, 50 per cent. in 3.825 days, 72 per cent. in seven days and 99.5 per cent. in thirty days. If therefore we start with a seed containing one millicurie of radon and it

is left in position for 3.825 days, 0.5 mc. will have been destroyed, if left for a week 0.72 mc., and if a month practically the whole millicurie. One millicurie destroyed is equivalent to 133 milligramme hours of radium. One milligramme hour is equivalent to 0.0075 millicurie destroyed. One millicurie for seven days = 0.72 millicurie destroyed = 96 milligramme hours (approximately).

One millicurie of radon left in position for - -	1	2	3	4	5	6	7	8	9	10	30	days.
Is equivalent to -	22	40	56	68	79	88	90	102	107	111	133	milligramme hours (O'Donovan and Brain).

*Filtration or screening.*—I have worked entirely with seeds screened with  $\frac{1}{2}$  millimetre of platinum. This cuts off all alpha rays and practically all the primary beta rays, and allows only gamma rays to emerge. Some secondary beta rays are given off from the platinum, but they are of small penetrative power and merely cause a slight necrosis immediately around each seed. This serves to make it easy to extract the seeds at the end of the treatment. The seeds I have used have all been supplied by the Radon Department of St. Bartholomew's Hospital. They are little cylinders of platinum 6 millimetres long and 1.25 millimetres in diameter, the walls being 0.5 millimetre in thickness. Inside this cylinder lies the actual glass "seed." One end of the platinum case is a blunt point and the other is rounded with a stout black thread issuing from it.

If it is desired to use beta rays the bare glass seeds can be inserted in the growth and left there, or for surface application they can be attached to strapping or columbia paste (wax 40 parts, liquid paraffin 40 parts, finely pulverized sawdust 20 parts) and a filter of 0.1 to 0.2 millimetre of aluminium interposed to cut off the softest beta rays.

*Technique of insertion.*—In the majority of the 75

cases I have treated up to date the seeds have been inserted into the thickness of the growth itself or under the skin immediately around it. If the growth is very small, e.g. comparable with the length of the seed itself (0.6 centimetre), one seed only need be used. A little novocaine (2 per cent.) is first injected underneath the growth with a fine hypodermic needle. A large sized intravenous needle is then pushed along the track made by the hypodermic needle. The intravenous needle should have a diameter slightly larger than the seed. The seed is then picked up in a pair of dressing forceps, holding it by the thread close to where this enters the platinum case. As soon as the large needle is withdrawn the seed is inserted into the hole left by



FIG. 1 —Radon seeds with threads attached, inserted in keloidal operation scar in neck.

it and pushed with the nose of the forceps until it lies horizontally under the middle of the growth. A little of the thread is pushed into the hole after it to prevent any tension on the thread from disturbing the position of the seed. The thread is then cut off an inch or so from the skin and a small collodion dressing applied to keep it in position. R. T. Brain uses a double-edged tenotome, 2 millimetres broad, instead of the intravenous needle, and perhaps it may be preferable. The seeds and their threads are sterilized by lying in

a gallipot of ether while the preparations are being made for their insertion. It is important to remember that seeds should under no circumstances be touched by the fingers, but should always be handled with a long pair of forceps.

Comparatively few rodent ulcers are small enough to be dealt with by a single seed, and if the growth is over 0.6 centimetre in length I always use two seeds, one at each end of the growth 1 centimetre apart. In larger growths the seeds must be inserted all round the periphery, either radially, at intervals of 1 centimetre, or tangentially, preserving the same interval of 1 centimetre between the centres of successive seeds. In no case should seeds be inserted in the centre of a growth. If the growth is too large to be dealt with by radiation from the periphery, an inner ring of seeds should be inserted. If seeds are put at the centre an overdose there is certain to result.

*Dose.*—Apparently about 100 milligramme hours of gamma radiation are required for each cubic centimetre of a rodent ulcer and 150–200 milligramme hours for the same quantity of squamous epithelioma. These doses are obtained from seeds of 1.1, 1.65 and 2.2 millicuries content respectively, left *in situ* for seven days.

In the majority of skin lesions one can neglect the thickness of the growth, which is seldom more than 1 centimetre, in calculating the dose required, and can therefore allow 100 milligramme hours for each square centimetre of surface in the case of rodent ulcers. If one is using two seeds for a rodent ulcer 1 centimetre in length, one still uses seeds of 1.1 millicurie each, because, being at opposite ends of the growth, less than half the radiation from each seed reaches the growth. If the seeds, instead of being merely at opposite ends of the growth, form a complete ring round it, that is when four or more seeds are used, the amount of radon in each seed should only be so much that the total amount present will



add up to 1.1 millicuries per square centimetre of growth (if rodent ulcers). For example four seeds, used to surround a rodent ulcer 1 square centimetre in area, should contain 0.28 millicurie each. If the growth is friable the seeds should be inserted under the skin at the margins of it, for if put into the growth itself one or more seeds may fall out of their position as the growth necroses under the influence of the radon. This may result in over-dosage at one point and under-dosage at another.

*Reaction.*—Patients usually have but little discomfort while the seeds are *in situ*, and at the end of the week the collodion dressing is removed and the seeds pulled out by means of the attached thread. This causes no pain. In some cases a zone of erythema is now visible extending about one centimetre around each seed, but this may not be seen till another week has elapsed. Calamine lotion or a boric lint dressing is applied according to the amount of ulceration. The amount of reaction varies a good deal in different patients. If the dosage and spacing of seeds has been correct and the patient has not had previous X-ray or radium treatment it is seldom troublesome. In one of my cases where three seeds were inserted in a recurrence in the scar of an operation, and got too close together, owing to the liquefaction of the growth, a small radium ulcer was produced which took nineteen weeks to heal, and in another, which had had four previous X-ray treatments elsewhere, the ulcer took nine weeks to heal. In ordinary cases, however, the skin heals in four to six weeks. A good dressing for lesions which show an excessive reaction is the following :—

R	Radiostol in liq. paraffin (B.D.H.)	-	1 part.
	Lanoline	-	1 part.
	Vaseline	-	1 part.

The scars produced by radon treatment are very good, as was seen in some cases I showed at the

St. John's Hospital Dermatological Society on November 25, 1931.<sup>2</sup> In about four cases I have seen slight bluish staining at parts of the sites of certain of the seeds. Of the nature of this pigment I am at present uncertain.

*Surface application.*—I have only applied radon seeds to the surface in eight cases up to date: two cavernous angiomas, one keloid, one rodent ulcer and four warts. The platinum seeds should be separated from the skin by 0·1 or 0·2 millimetre of aluminium, by a minimum of two thicknesses of adhesive strapping or by several layers of lint, or by  $\frac{1}{2}$  to 1 centimetre of columbia paste, in order to cut off the secondary beta rays given off by the platinum, which would cause ulceration of the skin. In the case of the lint and columbia paste, the effect is also to increase the distance of the seeds from the skin and so to produce a more even effect both in depth and on the surface. In non-malignant conditions a dose of less than 1 millicurie per square centimetre is probably sufficient (in naevi in babies about  $\frac{1}{4}$ — $\frac{1}{2}$  of this amount), but I have generally used seeds of one millicurie and allowed the reduction of the dose to be brought about by the distance by which the seeds are separated from the skin, or by reducing the number of days for which they are applied. The results in the eight cases mentioned have been good, although in the case of three of the warts there was temporarily rather an excessive reaction, probably as a result of placing the seeds directly on the warts without intervening strapping, and in one of the angiomas and in the keloid there was some temporary destruction of the epidermis.

*Supply of radon.*—As stated above, all my radon has come from the Radon Department of St. Bartholomew's Hospital, but this department only supplies radon to the members of the staffs of St. Bartholomew's and other teaching hospitals. Radon can, however, be obtained from the London Hospital

and from the Radium Institute. The usual cost for private cases is 2s. to 2s. 6d. per millicurie, plus 1s. 9d. or so for each platinum filter. It should be ordered a few days before it is required. The day and hour at which it is to be used should be stated, because the seeds are made up of such a strength that they will have wasted down to the desired radon content by the time of insertion. The number of seeds, dose in each, thickness of filter, and whether threads are required or not, should be specified at the time of ordering.

The advantages of radon over radium in needles are the following:—

(1) Its relative cheapness and its flexibility as regards methods of application and dosage.

(2) The seeds being so small can be inserted into positions about the inner canthus, where there is little room for a needle.

(3) The dose in each seed can be of any size required.

(4) The dose in each seed is uniform along the length of the seed, which cannot always be said of a radium needle.

(5) There is no need to lock up several hundred pounds in purchasing radium needles, which have to be kept in a safe place and may be lost or stolen.

(6) The intrinsic worth of a seed is so small that there is no objection to allowing a patient to go away with a number of them *in situ*.

(7) If something prevents the patient from returning at the proper time no great harm would be done, owing to the decreasing potency of the seeds.

Over radium in plaques radon seeds have the advantage that gamma rays can be used. Plaques, being usually of small radium content (2·5 or 5 milligrammes per square centimetre), have to be used unscreened or very lightly screened, so that their effect depends on the beta rays. If they are used with a  $\frac{1}{2}$  millimetre of platinum or 1 millimetre of lead filter to get the effect of the gamma rays, the exposure has to be

inordinately long. In my experience gamma radiation is preferable to beta radiation even for superficial growths, for I have seen so many rodent ulcers fail to disappear after beta radiation, or recur after disappearing, and then be subsequently successfully removed by gamma radiation.

The principal disadvantages of radon as compared with radium are the following :—

(1) The need to be within reach of a source of supply. Radon can, however, be sent by post.

(2) That one is absolutely dependent upon the technician who prepares the seeds for the presence of the stated dose in each seed. It is therefore essential to obtain seeds from an absolutely reliable source.

(3) The fact that radon decays to half value in 3.825 days is not a serious disadvantage, for in actual practice I find that one always leaves the seeds *in situ* for one week, so that 1.1 m.c. = 100 mg. hours, 0.55 m.c. = 50 mg. hours, 2.2 m.c. = 200 mg. hours, and so on.

If further information on the subject of radon in dermatology is required, reference may be made to papers by O'Donovan and Brain,<sup>3</sup> by R. T. Brain,<sup>4</sup> and to the textbooks of McKee<sup>6</sup> and Hazen<sup>7</sup> on X-ray and radium treatment in diseases of the skin. Skin cases treated by radon have been shown at the Dermatological Section of the Royal Society of Medicine<sup>1</sup> and at the St. John's Hospital Dermatological Society.<sup>2, 5</sup>

#### References

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<sup>6</sup> McKee : "X-Rays and Radium in the treatment of Diseases of the Skin." Second ed. London : Henry Kimpton, 1927, p. 67.

<sup>7</sup> Hazen : "Cutaneous X-Ray and Radium Therapy." London : Henry Kimpton, 1931, p. 37.

# Some Uses of Ultra-Violet Radiations in Skin Diseases

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IN dermatology, the long ultra-violet and the light rays are the most important. It is sometimes stated that the bactericidal rays are the important ones in the treatment of diseases of the skin, but, in my opinion, they are practically useless. If the organisms are on the surface, as in impetigo contagiosa, they can easily be killed by ordinary remedies. If they are deep, the short or bactericidal rays cannot reach them as these rays have little or no penetration. It is frequently claimed that the mercury vapour lamp is of more use in dermatology than is the carbon arc, but with this claim I cannot agree. Apart from the local treatment of lupus by pressing the water-cooled Kromayer lamp against the diseased part, there is nothing in the treatment of skin diseases which cannot be accomplished with the carbon arc as satisfactorily as with the mercury vapour lamp, provided the right type of carbon is chosen. For ordinary work pure carbon or the white flame carbon will give excellent results. If in certain conditions a more irritating effect is desired, e.g. in alopecia areata, this can be brought about quickly by the use of an iron-cored carbon. In few skin diseases is local radiation desired and in these exceptional cases it is an easy matter to screen the parts not to be radiated with towels, bandages or even smearing the parts with vaseline. A simple localizer, similar to those supplied with the mercury lamps, can be made for the carbon arc also.

Another reason for preferring the carbon arc is the uniformity of output and consequently the more satisfactory dosage which can be administered. It is not sufficiently realized how marked is the diminution of intensity of radiation from the mercury vapour lamp with use. According to Kinloch<sup>1</sup> the vacuum type shows a fall in output from 230 units to 90 units in 200 hours' burning and to 40 units after 400 hours. Some types show an even more marked reduction. Recently I tested a mercury vapour lamp and found that after 60 hours' use the output had fallen to less than one-fifth of its original intensity. Under such circumstances it is obvious that the dosage with the mercury vapour lamp must be haphazard.

Tuberculosis of the skin, both in its manifestation as *lupus vulgaris* and as *scrofuloderma*, stands foremost as amenable to treatment by radiations. It is not sufficiently realized how miserable is the lot of the patient who has extensive lupus vulgaris. As the condition is most common on the face, the disfigurement is considerable and such patients are usually shunned by others. It is now more than thirty years since Finsen demonstrated to the world the change which could be brought about in lupus vulgaris by concentrated arc light. The treatment by general radiations marks as great an advance on Finsen's original method as that did on the remedies previously employed, and a new vision of life has been given to the sufferers from this disease. The disadvantage of the Finsen treatment was the time taken to treat an extensive case. General radiations do just as well in extensive cases as in localized ones.

It is sometimes stated that general radiations alone will not cure lupus, but this is erroneous. We have unfortunately a large number of cases of lupus in Edinburgh and neighbourhood and after an extensive experience with the radiation treatment of this disease I have no hesitation in saying that lupus can be cured

by general radiation treatment. At the same time, however, it may not be desirable to rely on this treatment alone and I regularly employ other methods of treatment such as the application of trichloroacetic acid or other caustic in addition to the light treatment.

The type of lupus in which the most dramatic results are obtained is the catarrhal. Even within two or three weeks it is frequently found that the part is drier and looks healthier, but the clearing up of the catarrh ought not to be mistaken for the cure of the lupus, as is not infrequently done. Another type which does well is that in which the patches are rather swollen and turgid. After a few weeks the lesions become much flatter and soon are level with the skin. The dry flat type takes longer, but cure can be brought about with perseverance. If there is much fibrous tissue, usually from previous X-ray treatment, the progress is much slower, while still more stubborn is the thick warty type of lupus. The type of tuberculous lesion which is the most resistant to light treatment is the pseudo-elephantiasis type, and I have never seen much improvement brought about by radiations in these cases.

Scrofuloderma does well, as a rule. The discharge may become more profuse to begin with, when there is a sinus, but as the treatment progresses, the discharge steadily diminishes and finally ceases. The glands decrease in size and eventually disappear, while the skin infection steadily improves and cure is brought about. It is unfortunate that there is such delay in sending these cases for radiation, as the longer the duration of the disease the longer must be the course of treatment required to effect a cure.

*Alopecia areata* is a disease in which ultra-violet ray treatment has been claimed as an infallible cure. It is certainly a valuable remedy in many cases, but to speak of it as a specific remedy is to show a lack of knowledge and experience of the disease. The

condition is very capricious and often resists all forms of treatment, and the last remedy—and the last practitioner—always gets the credit of the cure. The mercury vapour lamp has been used by dermatologists in the treatment of this disease for more than twenty years and I am certain that not one of them would claim that every case is cured. Many cases fail to respond at all, even after prolonged treatment. There is no doubt that many cases do well, but I have seen quite a number become steadily worse even under vigorous ultra-violet radiations. In alopecia areata the doses to the scalp must be sufficiently great to produce a brisk reaction. The redness ought to be allowed to pass off completely before another dose is given. In complete baldness the head ought to be treated in sections at intervals of a few days rather than the whole scalp irradiated at one sitting.

*Furunculosis*, especially in its chronic form, responds well to radiations. Patients with this condition are generally much below par and a course of general radiations tones them up and enables them to overcome the infection. If there is only one large boil, the pain is speedily eased and the limpness soon passes off, but radiations are, perhaps, of more value in patients who have successive crops of boils.

In *sycosis* the results of radiation treatment are similar to the results of other treatment, sometimes very gratifying, sometimes very disappointing. It is not infrequently advised that exfoliating doses should be given for this condition, but as the causal organisms lie deep in the hair follicles, the rays which cause exfoliation cannot reach them and it is by raising the general resistance to the staphylococcus that improvement is brought about.

*Psoriasis* is another disease in which brilliant results are claimed for radiation treatment by non-dermatological writers, but no dermatologist ever seems to have attained such results. I have tried radiations



repeatedly in psoriasis and while in many cases I have had excellent results, in many others no success has been attained. The cases which respond are those in which the patches are thin; when the patches are thick they are more resistant. This is what happens with other remedies also.

On one occasion I was asked to treat a man with large indurated patches of psoriasis on which ordinary treatment seemed to make little or no impression. The radiations had apparently just as little effect and I advised him to discontinue the treatment. He resumed treatment with the ointment which he had been using without any benefit for a month before beginning radiation treatment, and within a fortnight he was about 50 per cent. better. Evidently the radiations had in some way altered his skin and caused it to respond to an ointment which had previously had no obvious effect.

In treating psoriasis with radiations it is not advisable to give doses which cause a brisk reaction, as in this way the disease is not infrequently spread. The patch treated clears up but the surrounding skin immediately begins to show psoriatic lesions and the patient's last state is worse than his first.

In *herpes zoster* radiations are of use only in the relief of pain which so frequently accompanies or follows this disease. When the initial pain is severe it is frequently found that after even only one or two doses the patient is able to get better sleep. In this way considerable benefit is conferred, especially on old people. When the pain persists after the eruption has disappeared, radiations may also be employed with benefit. This is a point which does not seem to be sufficiently realized by many practitioners.

In *lupus erythematosus* radiations must be employed with great caution. It is well known that sunlight not infrequently aggravates the disease, though in other cases it is beneficial. For this reason the effect of the initial doses must be carefully watched and the treatment stopped at the first sign of deterioration. Patients who are receiving injections of any of the gold preparations used in the treatment of this condition, must on

no account be given radiation treatment because of the risk of a lilac discoloration of the skin being produced.

In *dermatitis* or *eczema* radiations are sometimes of value. In all such cases an attempt must be made to discover the cause as it is unlikely that radiations or any other form of treatment will cure the condition if the cause is still allowed to act. Many cases of epidermophytosis, for example, are still diagnosed as dermatitis and it is obvious that radiation treatment will not cure such a variety of dermatitis. Unless this and other recent advances in dermatology are kept in mind, mistakes in diagnosis and treatment will occur.

Cases of acute dermatitis are, as a rule, not suitable for radiation treatment although Lomholt<sup>2</sup> reports good results in acute eczema from concentrated arc light treatment. The chronic cases are the most suitable for radiations. When no obvious cause can be found, it may be that the condition is kept going by faulty metabolism, and the radiations would seem to alter this and cause them to respond in a gratifying way. One case may be quoted to illustrate this:—

A practitioner who had a moist dermatitis of his hands, was sent to me for radiations. He wished to install apparatus for himself and came to me for advice as to the type he should procure. On seeing his condition I informed him that radiations might not be helpful and suggested that I should give him some treatment and see the response before he decided to get apparatus for himself. While under my care he used a simple ichthyol paste dressing which he had been applying previously. This was done to eliminate any possibility of a different application being responsible for any improvement or deterioration in the skin condition. By the time he had had thirteen doses his skin was completely well and has remained so since he completed his treatment three years ago.

While far from recommending that radiations should be given to every case of dermatitis, I do think that when the condition has resisted proper treatment, it is worth while trying the effect of ultra-violet radiations.

There is one type of dermatitis which does repay the time and trouble given in treating it with ultra-

of the cessation of the treatment it was as bad as ever.

Recently I saw a lady who had had a course of ultra-violet ray treatment for her acne three months previously and she presented one of the worst cases of acne I have ever seen. She stated that the condition had improved while she was having the radiations, but had become bad again almost as soon as they were stopped.

Many non-dermatological writers advise exfoliating doses, but the same result can be achieved by the use of a peeling paste and with more control over the reaction. It does not seem justifiable to put patients to the expense of a course of ultra-violet radiations when the same results can be obtained at a fraction of the cost with a peeling paste. In any case the results are not in the least comparable to those obtained with X-ray treatment and I would never advise a patient with acne to have ultra-violet rays. Andrews<sup>3</sup> recently has advocated the use of ultra-violet rays to clear up the pitted scars left by acne, but I have no experience of their use in this way.

Claims have also been made of cures in *ringworm* of the scalp treated with ultra-violet rays, but again such claims have been made by those not familiar with the disease or its treatment. The bactericidal rays cannot reach the fungus, which extends to the bottom of the hair follicle. The deliberate provoking of a brisk reaction on the patch is to be strongly condemned as such a reaction cannot be easily controlled, kerion may develop and a patch of permanent baldness result. The only satisfactory treatment of this condition is epilation by means of X-rays or thallium. Dermatologists have frequently had to treat in this way cases of ringworm of the scalp which were supposed to have been cured by ultra-violet ray treatment.

There is one use for ultra-violet rays in ringworm of the scalp and that is in diagnosis. A filter of Wood's glass is sometimes used to help in the diagnosis. This glass contains oxide of nickel and cuts out all rays above 3650 Å. U. When such a filter is placed between the source of ultra-violet rays and the child's head in a

darkened room the ringworm hairs will fluoresce a brilliant green, while the normal hairs do not. There is a risk, however, of overlooking ringworm if one relies entirely on this method, as Wigley<sup>4</sup> has pointed out that hair fully infected with endothrix ringworm completely fails to fluoresce, apparently because the cuticle of the hair is intact.

Ringworm of the body also is occasionally treated with ultra-violet rays, but ordinary remedies clear up this condition without much difficulty and there is no need to use radiations. In the same way it is wrong to attempt to treat impetigo contagiosa by ultra-violet radiations. An ordinary case of impetigo clears up in a week or ten days. If it does not, the treatment is wrong, or if the right treatment has been prescribed, the instructions for using it have not been properly carried out.

*Keloid*, *nævi* and many other conditions have been treated with ultra-violet rays, but other methods give better results and it does not appear to be justifiable to use radiation treatment under these circumstances. The treatment of such ordinary conditions with ultra-violet rays when better results can be obtained by the use of other remedies can only have the effect of bringing radiation treatment into disrepute.

### References

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# Errors and Accidents of Treatment

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THE exhortation *Primum non nocere!* should be more carefully observed in dermatological than in any other branch of medical practice, for the patient can see as readily as he can feel the results of treatment. The besetting sin is over-treatment. Too much zeal was responsible for quite a considerable percentage of skin casualties in the late war, and even to-day it is often necessary to counteract the effects of sulphur or iodine dermatitis before coming to grips with the primary cause of the eruption or pruritic symptom. In most cases the patient is to blame, but it is still not sufficiently realized in medical circles that all accessible parasites and organisms are exceedingly easy to destroy, and when a weak antiseptic fails to achieve results, the cause of failure is inaccessibility rather than a specific resistance.

The case of *scabies* illustrates the argument: the acarus is accessible only at night time when it feeds and breeds on the surface of the body. A thin film of a weak parasiticide ointment or oil (the best for private use is undoubtedly mitigal (Bayer)) is applied to all parts except the head and neck, for three successive nights only. There is no need whatever to use a scrubbing brush, or open burrows mechanically with a needle. The inexorable laws of biology ensure that each generation of parasites will hatch out from the runs in 48 hours. It follows therefore that if all the adults on the surface are killed by the first application, there are only two generations to be accounted for, unhatched as yet in the burrows, and these will perish in the second and third anointings. What need, then,

for baths during the treatment? Of what value the application of sulphur in a vaporized form? Why use force and friction to ensure penetration? The skin cannot be penetrated by sulphur, it can only be irritated, as it very frequently is by those who ignore the fundamental principles of scientific therapy. And then the official B.P. sulphur ointment—i.e. 1-9 parts benzoated lard—is far too strong. For children under ten years of age it may be mixed with three parts of zinc ointment or vaseline, and for adults with equal parts. With B-naphthol 1 per cent. ointment, with or without balsam of Peru, the results are just as good as with sulphur, and I have yet to see dermatitis or constitutional effects from its application.

The management of *impetigo contagiosa* often illustrates the risks of over-treatment. Most of the cases occur in the first decade, when the cuticle is still delicate and rather sensitive to all forms of chemical stimuli, and especially to maceration by soap and ointments. The former often causes round scaly evanescent patches on the face, the latter are inevitably applied to every type of eruption, whether acutely septic, as in the disease under discussion, or chronic, as in seborrhoea and psoriasis. The popular prescription for this is the ammoniated mercury ointment. Now impetigo is a vesicular disease, and therefore the aim should be to dry up the vesicles before they rupture and discharge their highly infective serous content over the surrounding skin, and other parts of the body by contact with the fingers, soiled dressings, and so forth. Some such purpose may have inspired the old habit of applying tincture of iodine. But this again is far too strong, and the element itself exceedingly irritating, even to normal skins on which, as is well known, it acts as an exfoliant. To these two actions, viz., irritation and exfoliation, is often added the macerating action of a relatively strong ammoniated mercury ointment, and the result in a case of impetigo

is just as might have been expected, copious discharge, excessive crusting, sepsis and general spread of the infection. All this would certainly have been avoided if the delicate and simple nature both of the infecting agent, a streptococcus, and the infected integument had been remembered. Frequent bathing with a weak mercurial lotion (e.g. lot. nigra B.P.) or with a 0.5 per cent. solution of copper and zinc sulphate is sufficient to kill any streptococcus so close to the surface as in this disease, and if a little spirit of camphor (1 per cent.) be added the tendency to desiccation will be enhanced; no dressings should be used.

*Ringworm*, whether of the glabrous skin or the scalp, is always painted with iodine, as soon as even a suspicion of its nature is current. On the body a weak dilute tincture does not do any harm and usually succeeds; but on the scalp it does no good whatever and may increase the difficulty of diagnosis, and thus postpone efficient treatment. "Ringworm" of the extremities, usually of the crutch or toes, is always severely irritated by iodine, and the ensuing eczematization may greatly hamper all therapeutic efforts along accepted lines. In these situations pending the acquirement of experience, lavage and foot-baths of a 1 in 5,000 solution of potassium permanganate should be prescribed. This it seems may be applied in acute dermatitis of almost any etiology. In Professor Ramel's clinic at Lausanne it was, until quite recently at any rate, the routine procedure even in exposed situations, such as the hands. It has a marked anti-pruritic effect, and in weaker solutions may be used for this purpose in a 30-gallon bath. Its effects are purely local, there is no danger of toxæmia by absorption, and in strong solution or in crystal form it is a valuable caustic in lupus vulgaris.

Tar is a most valuable drug applied in suitable cases and in the proper way. For eczema (allergic dermatitis) it is still the most reliable weapon. It must not be

used in septic cases, but there is very little risk of aggravating any stage of the disease if this is absent, and the remedy is applied tentatively, first as a 1-2 per cent. lotion, with or without lead, then, as desiccation proceeds, in the form of a cream, or with Lassar's paste, and finally, especially in the anticubital fossæ and popliteal spaces, as a paint, mixed with an equal part of collodium flexile once or twice weekly.

Modern dermatologists are increasingly using hypodermic medication; for syphilis it has become the accepted method, and various drugs are administered intravenously and intramuscularly in weekly injections over many months and even years. Considering their number, it is surprising how few accidents are recorded; they are of two classes: (1) immediate and local as a result of sepsis, intolerance perhaps due to idiosyncrasy or faulty manufacture, or escape into surrounding tissue of a solution designed exclusively for intravenous use, and (2) the graver form in which toxæmia or generalized dermatitis sometimes lead to a fatal issue. Of class 1 it may be asserted that even the most skilful operator occasionally misses or partially transfixes a vein, and he always, or always should, anticipate this contingency. A few drops of the ordinary N.A.B. in the subcutaneous tissues are quite sufficient to provoke a painful indolent infiltration lasting for weeks and disabling the ordinary manual worker from earning a living. If the accident is



FIG. 1.—Result of the injection of solutions of N.A.B. designed for intravenous use only, into the buttock.



recognized at the moment of injection the needle should be left *in situ*, and the syringe carefully detached from it without shifting its position or plane in the tissues. From another syringe, which *ought always to be kept filled for the emergency*, 5–10 c.cm. of normal saline are immediately injected in the actual plane of the misdirected N.A.B. solution. I believe this little manœuvre has obviated much unnecessary suffering over a number of years in my department at the Royal Northern Hospital. I have tried sodium thiosulphate as an antidote in this situation, but have not found it superior to saline, although, as I pointed out in 1924, it is of the greatest value in mercurial and bismuth stomatitis, and should always be used in the early stages of salvarsan jaundice and dermatitis. In such cases it must be given intravenously, and can be



FIG. 2.—So-called chemical ulcer following faulty technique in the injection treatment of varicose veins. A 5 per cent. solution of sodium salicylate had been used.

repeated every day or on alternate days in 0.6–0.75 gram doses dissolved in 5–10 c.cm. distilled water. It is quite innocuous, and Ravaut has administered up to 5 or 6 gram doses at a time. The widely adopted modern injection treatment of varicose veins occasionally leads to accidents resulting from an extraveneous leak at the time of the injection (Fig. 2). The most dangerous drug in this respect is sodium salicylate; in the

10 per cent. solution, originally recommended by Sicard and others, it is definitely caustic, and the operator may prefer to use other solutions, such as the

quinine urethane or sodium morrhuate, which is popular in this, the country of its invention.

Serious results sometimes follow the administration of gold salts. In dermatology the drug has proved successful in quite a high percentage of cases of lupus erythematosus, and there is no other weapon of equal potency at the present time. The intravenous route is undoubtedly to be preferred, but occasionally veins may be exceedingly difficult to find, or the operator may not have sufficient experience for the manoeuvre.

A substance of equivalent gold content designed for intramuscular injection by a Continental firm was recently prescribed for two cases of lupus erythematosus, and administered by the intramuscular route in identical doses, suggested by the manufacturers' brochure, over a period of six weeks. The first case, a long-standing example of the typical disease, was greatly benefited after six injections, and except for a little rheumatic pain and a metallic taste in the mouth, suffered no inconvenience.

The other, a woman aged 28, who had a small patch of lupus erythematosus on the right cheek for about 7 months, began to improve after four injections. After the fifth, a rash appeared on the forearms. In spite of this she was given the final dose of 1 gram a week later, when I was consulted on November 30 she had a severe generalized erythema, with a sort of "wooden" infiltration on the neck, not unlike cancer *en cuirasse*. A week later the whole body was involved, and the hands had begun to exfoliate (Fig. 3). Later, the exfoliation became general, her condition was extremely grave, and she was removed to hospital.

The percentage mortality in such cases is very high, and the patient was exceedingly lucky to escape with her life. It is al-



FIG. 3.—Exfoliative dermatitis due to over-treatment of lupus erythematosus with a gold salt given by intramuscular injection. The dermatitis was very severe and became general. Patient recovered after 8 weeks.

most certain that if no further injection had followed the warning rash that appeared after the fifth injection, this serious complication would have been avoided. It should also be noted, in spite of the manufacturers' edict to the contrary, that anything exceeding 0.25 gram of any gold compound is a dangerous dose. Successful results are frequently obtained with 0.1 gram given in weekly doses over a period of a month or two. Very much the same warning applies to salvarsan and its substitutes, and although toxic manifestations are liable to occur with quite small doses, such as 0.3 or 0.45 gram, if they do occur after 0.75 or 0.9 gram doses, it is difficult to avoid the conclusion that the patient was over-dosed, and might have escaped the complication on the smaller amounts.

With the advent of X-rays and radium, the accidents and risks of dermatological treatment were greatly increased. According to McKee and Andrews, two American authorities of repute, X-ray treatment can be applied with benefit in no less than 81 dermatoses, which is almost equivalent to asserting that they are universally applicable in dermatology. My own experience has confirmed that view to some extent, but it has also taught me never, in any circumstances, with the possible exception of malignant disease, to exceed the skin tolerance dose, which is just that amount of X-rays which will cause the hair to fall out in fifteen days after radiation. If this dose, which I regard as unnecessarily high (except in tinea tonsurans), has to be repeated, at least a fortnight or three weeks should intervene, and a careful watch kept, and the patient interrogated for the development of erythema, however slight.

This erythema is the first stage of an X-ray burn, and there is no dermatological condition which justifies its production. Since using a 0.5 aluminium filter in both hospital and private cases, I have never seen it, even after five or six applications of the sub-epilation dose I usually recommend for chronic and inveterate

acne of the face or back.

Many patients have been overdosed for *pruritus ani* or *vulvæ*, and their condition rendered thereby the more intolerable. It is a good rule that if the symptoms are not relieved at all after two doses, no further attempt should be made, and even when the rays do good it should be remembered that it is better to stop short of a complete cure rather than expose the patient to the risk of an X-ray ulcer.

It would follow apparently that if large or repeated doses have to be given, the disease must be proportionately serious, and I am therefore tempted to assert that for relatively banal conditions like warts, particularly plantar warts, for which various more simple and relatively harmless treatments are available, neither the X-rays nor radium ought to be prescribed. I have twice seen a severe burn from this cause, and two cases were shown at the International Congress of Dermatology, Copenhagen, 1930 (Fig. 4). Fig. 5 depicts the



FIG. 4.—X-ray ulcer following treatment for a plantar wart.



FIG. 5.—Radio-dermatitis and ulcer over Achilles tendon, resulting from X-ray treatment for lupus verrucosus.

final result of an attempt to cure verrucose lupus of the skin over the Achilles tendon by X-rays. The patient had had frequent exposures over a number of

years, and it is safe to say that he would have been considerably better off at the time I was consulted if no treatment whatever had been applied. It is questionable if X-rays ought to be used for lupus in any form, except by a dermatologist of experience, who can evaluate exactly the possible benefits and risks. For psoriasis all treatment is temporary only in its effects. Repeated irradiation by X-rays is a medical misdemeanour, and would not be recommended or allowed in any clinic of repute.

Radiotherapy for *hypertrichosis* should be forbidden by law. It is curious how this danger to the community has been overlooked, for there are many totally unqualified and advertising persons who, for a fixed fee payable in advance, will guarantee to rid their clients of their unwanted hair, whether in the axillæ or on the face. It cannot be too emphatically stated that it is impossible either with the X-rays or radium to destroy the hair papilla without at the same time causing irreparable damage to the vascular, adipose and connective tissue framework in which nature has implanted it, and of which embryologically it is an integral part. Every textbook reiterates this assertion, and it is almost incredible on the available evidence that unqualified cosmetic specialists are still allowed to advertise and maintain the contrary in fashion and social journals from week to week. One firm actually has the temerity to invite the client's own doctor to attend to see for himself the harmlessness of the procedure! Will they be equally frank when, in from two to five years' time, the unfortunate victim presents herself with cutaneous atrophy, pigmentation, and telangiectactic changes of repellent and ineradicable type? I have seen three such cases recently, and expect to see many more in the future.

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# Skin Diseases in General Practice

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SKIN diseases in general practice may be divided, broadly, into the parasitic and the non-parasitic. In a short article it is only possible to give suggestions which may be of help to the practitioner in the diagnosis and treatment of the more common diseases. Frequently a good remedy is tried in a haphazard fashion without instructions having been given as to its use. A minute or two spent in giving directions often means the difference between success and failure. How frequently is rest in bed overlooked in treatment of the skin! Inflammations of other important organs are so treated, but inflammations of the skin do not receive the same obvious consideration. Then, again, sepsis, so frequently the power behind the disease, if not the actual cause, is forgotten. Surgical cleanliness must be insisted on if good results are to be obtained.

## ANIMAL PARASITES

The great difficulty in dealing with these pests is the liability to re-infection. They are more common in winter and usually more than one member of a household is infected. Scabies does not occur above the collar except in the infant, when the back of the neck and scalp may be infected from the mother's arm. As important as local medication are stoving and disinfection of clothing and bedding. Without these cure cannot be obtained. Gloves should not be overlooked in scabies treatment.

## VEGETABLE PARASITES

*Tinea capitis*.—Diagnosis is easy, but confirmation can be obtained by microscopic examination of the

stumps or by examining the scalp under Wood's glass, attachment of which for the mercury vapour lamp costs only a few shillings. Under this, infected hairs give a greenish-yellow colour which cannot be mistaken. Previous application of iodine invalidates this test. Ringworm of the scalp is rare above the age of 16. Treatment consists in epilation either with X-rays or by administering thallium. Rubbing in ointment in the hope of cure is tedious, both to the patient and parent and of questionable benefit. In the hands of the expert X-ray epilation is devoid of risk, and cure is obtained in under three months. Thallium is suitable for those who cannot keep still for X-rays—usually the very young. The dose, 8.5 mg. per kilo. body weight, must be carefully calculated, and epilation occurs in 20 days. The disadvantage is the rapidity with which re-growth takes place, favouring re-infection. After epilation the scalp is examined weekly under Wood's glass to watch the progress of the case and to remove infected stumps. A washable cap should be worn during treatment and the scalp annointed with ung. hydrarg. ammoniatum.

*Tinea circinata.*—In this the lesions are in rings, sometimes concentric, and in plaques. Diagnosis can be confirmed by microscopic examination of scrapings in liquor potassæ. In ectothrix infections the source can usually be traced to animals. Such lesions may be vesicular or kerionic, especially in the beard area. Ringed eruptions on the groins, thighs, gluteal cleft and axillæ must always be suspect; here infections spread rapidly because of the moisture and warmth.

In ringworm between the toes the epidermis looks sodden, and painful cracks develop on the plantar aspect. A superadded eczema may appear on the adjoining skin. In recurrent tinea of the trunk or limbs the toes should be examined for the source of infection. It is not always easy to find the fungus in scrapings from the toes. *Tinea unguium* may spread

from the surrounding skin, making the nails look brittle and opaque. Treatment of tinea circinata is simple and effective. Wash with soap and water and rub in ung. hydrarg. ammoniatum. Painting with tinct. iodi. to cause exfoliation is useful.

Whitfield's ointment—

R	Acid. benzoic.	-	-	-	-	-	grs. xxv
	Acid. salicylic.	-	-	-	-	-	grs. xv
	Paraffin. mol.	-	-	-	-	-	℥ii
	Ol coccois nucis ad	-	-	-	-	-	℥i

will clear ringworm of the groins and from between the toes. The ointment should be rubbed in night and morning after removing the sodden epidermis. Kerionic ringworm is treated as a septic condition as pustulation kills the fungus. Epilation of the beard area with X-rays may be necessary.

*Pityriasis versicolor*, due to the *Microsporon furfur*, is most frequently seen on the chest and intrascapular regions. It occurs in yellow or brown patches in those who perspire freely and do not change their underclothes often. The fungus can always be found. Washing with soap and water to remove the scale and rubbing in sulphur-salicylic ointment or vigorous rubbing with sodium hyposulphite lotion, ℥i to ℥i, will cure it. Frequent changing and disinfection of the underclothes are necessary.

#### MICROBIC INFECTIONS

Streptococcal and staphylococcal infections account for the largest number of cases of skin diseases. Streptococcal lesions are acute and vesiculo-pustular, staphylococcal are subacute and folliculo-pustular. Streptococcal infections are local, except when lymphangitis develops, while staphylococcal ones tend to lower the body resistance and become chronic.

Streptococcal infections—*pemphigus neonatorum* and *impetigo contagiosa*—are easily cured by local treatment, namely, opening the vesicles, removing crusts and scabs by starch poultices and cleansing with oil,



and dabbing on the following :—

R	Zinc sulphate	-	-	-	-	-	grs. vi
	Copper sulphate	-	-	-	-	-	grs. iii
	Aquam. camph. ad	-	-	-	-	-	℥i

The organism is not resistant, so “strong” applications are unnecessary. Ung. hydrarg. ammon., 2½ per cent., acts well, but must be rubbed in and applied on lint after cleaning.

Staphylococcal infections—*sycosis barbæ* and *pustular folliculitis of the scalp and thighs* are difficult to cure and liable to recur. In sycosis the hair should be cut short, not shaved, and the parts flushed daily by prolonged hot bathing. Rubbing in night and morning the following ointment is useful :—

R	Sulphur.	-	-	-	-	-	grs. xx
	Hydrarg. sulph. rub.	-	-	-	-	-	grs. v
	Ung. zinci ad	-	-	-	-	-	℥i

Epilation with X-rays is of great service in the chronic stages. Tonics and change of air are helpful, as are also daily exposure to the carbon arc lamp. Vaccines are only occasionally helpful. In pustular folliculitis of the scalp in the young thallium epilation may be tried if ointments fail.

*Furunculosis.*—In furunculosis attention to the general health is essential. Early opening is not advised, but application of Unna’s mercury and carbolic plaster is useful. Yeast, especially fresh brewer’s yeast, is of help, but calcium sulphide has proved valueless with me. Autogenous vaccines are sometimes wonderfully successful, as are also injections of collosol manganese every four or five days.

*Seborrhœa.*—The seborrhœic skin is dull and greasy, affording a ready soil for the growth of bacterial parasites. Many members of a family are often affected and the tendency is hereditary. It appears as the greasy scale on the infant’s scalp, which later shows as pityriasis capitis or dandruff. The skin of those suffering from dandruff is often affected with

seborrhœic dermatitis; it is liable to attack and spread from the central line of the body. The axillæ and groins are often the seat of a resistant type of the disease. On the trunk it appears as a folliculitis or in circinate patches, which have to be distinguished from pityriasis rosea and tinea versicolor. Thorough treatment of the infant's scalp would prevent many of the later seborrhœas. It should be washed daily and the following ointment rubbed in :—

R Sulphur.	-	-	-	-	-	-	grs. ʒ
Acid. salicylic	-	-	-	-	-	-	grs. x
Camphor. carbol.	-	-	-	-	-	-	ʒ xx
Paraffin. mol. ad	-	-	-	-	-	-	ʒi

For the pityriasis of later life weekly washing with spirit soap and daily application of the following is satisfactory :—

R Euresol	-	-	-	-	-	-	ʒii
Hydraig. perchlor.	-	-	-	-	-	-	grs. ii
Ol. ricini	-	-	-	-	-	-	q.s.
Industrial spirit to	-	-	-	-	-	-	ʒvi

For the trunk the sulphur-salicylic ointment acts well, but if acute a paste is preferable, such as :—

R Ichthyol	-	-	-	-	-	-	ʒ ʒʒ
Sulphur	-	-	-	-	-	-	grs. ʒ
Zinc paste to	-	-	-	-	-	-	ʒi

Cotton or linen must be worn, not wool.

*Acne vulgaris*.—Closely allied to seborrhœa is acne vulgaris, which attacks the face and upper parts of the trunk in adolescents. The age factor is important, and intestinal disturbances may be present. Comedones are always present, some of which inflame, giving the typical acne pustules. These, when healed, leave a scar. Marked atrophy and pitting may occur without much pustulation. The halogens give an eruption simulating this disease. In treatment the general health should be attended to and exercise in the open enjoined. Local treatment consists in long continued daily bathing with hot water and soap. The lather, if rubbed dry and left overnight, causes a gentle scaling

which is helpful. This is preferable to ointments, which young people find irksome. Daily application of the following is helpful :—

℞ Potassæ sulphuratæ	
Zinc sulphate	
Calamin	- - - - - aa ʒi
Glycerin	- - - - - ℥ xxx
Aquam. ad	- - - - - ʒiv

Vaccines will occasionally be found useful. Small doses of X-rays, especially in the indurated type, are often of value. Erythematous doses of the mercury vapour lamp are suitable for acne of the trunk. For the greasy, shiny face Sabouraud's lotion is useful, namely—sulphur precipitate 4 per cent. in bisulphide of carbon. The lotion is explosive if brought near an open flame and smells badly. It is best put on in the open, when the smell rapidly disappears.

*Acne rosacea* is a chronic affection of the face of spirit drinkers and, more frequently, immoderate tea drinkers. Ulceration of the cornea is sometimes seen in this condition. Regulation of diet with application of the potassa-zinc lotion during the day and nightly rubbing in the following ointment will be found useful :—

℞ Sulphur.	- - - - - grs. x
Ichthyol	- - - - - ℥ xx
Resorcin	- - - - - grs. xv
Ung. zinci ad	- - - - - ʒi

#### TUBERCULOSIS OF THE SKIN

*Scrofuloderma*, associated with deep tuberculous lesions, and *lupus vulgaris* are the common forms of tubercle in the skin. Scrofuloderma is most common in the neck, but lupus, whilst it may occur anywhere, is most common on the face. It starts as a small nodule with an apple-jelly appearance through the dioscope. It is usually single and the spread is by peripheral growth. In lupus affecting the nose the nasal mucosa should be examined. Diagnosis of the initial nodule is most important as cure can be effected

by excision. The later manifestations can only be treated in clinics.

#### NON-PARASITIC GROUP

Dermatitis includes *eczema* and *inflammations due to occupation*. They start as an erythema and may go through vesiculation and pustulation or become chronic. Trade dermatitis should clear on removal of the cause, though cure is often delayed. In treatment, protective dressings should be constantly applied and, if acute, rest in bed is desirable. Protection from strong winds and sunlight is necessary. While attention to the general health is essential, local applications offer the best means for relief and cure. In acute cases lotions applied as wet dressings, without protective covering, soothe by evaporation.

R	Liq. plumb. subacet.	-	-	-	-	3iii
	Zinci oxid	}	-	-	-	aa. 3ss.
	Pulv. amyli					
	Aquam ad	-	-	-	-	Oj

is useful. For night, linimentum calcis cum calamine is preferable. Crusts and scabs should be softened with starch poultice and removed with oil before dressings are applied. When exudation ceases, Lassar's paste acts well; ichthyol, 4 per cent., and, if itchy, camphor. carbolatum, 5 per cent., may be added. Tar paste is often useful, even in the acute facial eczemas of children.

R	Coal tar and zinc oxide	-	-	-	partes ii : mix.
	Pulv. amyli and paraffin. mol.	-	-	-	partes xvi : mix.
	Then mix both.				

A tar washed free from alkali is essential. This paste is also useful in chronic eczema. X-rays, in small weekly doses, are helpful in chronic itchy eczema.

The erythemata or toxic eruptions may be due to drugs, absorption of toxins or perverted digestive processes. The redness disappears on pressure, which distinguishes them from purpura. In *erythema multiforme* the eruption is symmetrical, favouring the extensor aspect of the limbs, purplish red in colour and

poly-morphic, sometimes bullous, in character. In many cases the buccal mucosa is affected. It must be distinguished from urticaria, and the bullous type from dermatitis herpetiformis. Recurrences are common. Treatment is general and locally calamine lotion relieves the burning itch.

*Urticaria* is the commonest of the erythemata; it occurs at any age and is due to a multiplicity of toxins. The urticarias of children are usually due to digestive disturbances and treated accordingly. In adults visceral disease, glycosuria, Bright's disease, etc., may cause it, but after excluding all such causes, a group remains which is difficult to deal with. It is in this group that removal from home surroundings and observation in hospital is advisable. Milk diet, diluted if necessary, for a week will often clear the symptoms. At the end of the week one article of diet is added every two days in the hope of locating the offending article. Milk itself may have to be excluded by putting the patient on a rice diet. Careful search for septic foci must be made. Autogenous vaccines from cultures of the stools, if extraneous organism is found, are sometimes helpful. Auto-hæmotherapy is of help; 5 c.cm. of blood is taken from the arm and injected immediately into the buttock. For relief of symptoms, cotton or linen is worn, and the following may be tried :

R	Sulphur.	-	-	-	-	-	-	grs. x
	Camphori carbolat.	-	-	-	-	-	-	ʒi xxx
	Paraffin. mol. ad	-	-	-	-	-	-	ʒi

Menthol, grs. ii may be added. To secure sleep antipyrin or luminal may be given.

*Lupus erythematosus* begins as a macule on the face, spreads peripherally and gives rise to the bat's wing appearance, with scarring in the centre. The lesion may be verrucose or covered with a fine scale which, on removal, shows plugs on the under surface. Around the edge of the lesion plugging is seen. Pyorrhœa and septic conditions of the naso-pharynx, if present,

should be dealt with before other treatment is begun. Intravenous injections of 1 to 5 c.cm. of a 0.1 per cent. solution of gold chloride will often clear the disease. Krysalgan or solganol may be tried, and also intramuscular injections of bismuth with rubbing in bismurung ointment. Calamine lotion is useful as a protective dressing. The disease is liable to recur on exposure to strong winds and sunlight.

*Erythema pernio*, or *chilblains*, is seen in the young and those with poor circulation. Hygienic measures should be adopted and cod-liver oil prescribed. Oral administration of calcium has proved useless to me, but intramuscular injections of colossal calcium are useful. Internally small doses of thyroid extract are of help. Locally, ung. iodi denigrescens or menthol 3i, in ung. zinci 3i, gives relief. If the skin is broken 2 per cent. acid carbollic in ung. zinci is helpful.

*Erythemato-squamous eruptions*.—Probably no eruption gives the general practitioner so much anxiety as *pityriasis rosea*, which is often mistaken for secondary syphilis. The signal spot which appears seven or more days before the general eruption on the trunk and adjacent parts of the limbs, is often overlooked. Viewed from a distance it can hardly be mistaken. The eruption is of two kinds, namely—small pink spots with fine scaling and larger almond-shaped lesions running in the line of the ribs with yellowish, papery scaling centres. There is no glandular enlargement or other signs of syphilis. Subjective symptoms vary from little inconvenience to marked itching. The diagnosis alone is important as the disease is self-limiting and clears in about three weeks with ung. salicyl. 3 per cent. The cause of *psoriasis vulgaris* still remains hidden, so treatment must be symptomatic; it is liable to recur. In acute cases rest in bed is essential, with the application of soothing ointments. Internally, salicin or quinine may be prescribed. For the chronic eruption, chrysarobin is the best drug, and

if the disease is extensive rest in bed during treatment is advisable. It is best applied in a base as follows:—

℞ Kaolin						
Pulv. amyli	-	-	-	-	-	aa ʒii
Paraffin. mol.	-	-	-	-	-	ʒiv
Chrysarobin	-	-	-	-	-	grs. x
Acid. salicylic.	-	-	-	-	-	grs. x

This is rubbed in night and morning until reaction is obtained, when a soothing ointment is necessary. For the large, chronic patches X-rays are useful. Internal medication always seems problematical. Chrysarobin cannot be applied to the scalp, but the following can be :

℞ Hydrarg. ammon.	-	-	-	-	-	grs. xv
Liq. picis. carbonis.	-	-	-	-	-	℥ xv
Acid. salicylic.	-	-	-	-	-	grs. x
Paraffin. mol. ad	-	-	-	-	-	ʒi

*Papular eruptions.*—Lichen planus is the most common; it appears as shiny-topped papules, which tend to aggregate and form plaques, giving a purplish or violaceous colour. The inside of the cheeks may be affected, but cannot be diagnosed here unless papules are found on the skin. Rest in bed is essential in the acute cases and removal from home surroundings is often advisable. Thorough de-intoxication of the intestinal canal by administering 1 oz. of Glauber's salts in the morning and fluids, but no solids, for 24 hours is satisfactory; next day ordinary diet is resumed. Liq. hydrarg. perchlor. or arsenic may be prescribed. Intramuscular injections of enesol are often helpful. Locally, the following relieves the itching:—

℞ Hydrarg. perchlor.	-	-	-	-	-	grs. ii
Acid. carbol.	-	-	-	-	-	grs. xx
Ung. zinci ad	-	-	-	-	-	ʒi

For chronic patches X-rays are often useful.

In conclusion, the largest number of skin diseases we see are simple and yield to simple remedies. Cure-alls are not to be desired, but excellent results can be obtained from a limited number of well-chosen remedies if used in the proper manner.

# Urticaria

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URTICARIA is a very common, well-characterized "type reaction" of the skin, brought about by a variety of agencies, some well understood and some quite obscure. The actual phenomenon of the urticarial lesion is the same as the experimental skin reaction called by Sir Thomas Lewis "the triple response." As Lewis's work is essential to the understanding of urticaria it must first be considered in some detail.

Firm stroking of the normal skin is followed by :  
(a) A local red reaction due to active dilatation of the minute vessels, including the terminal arterioles, capillaries and minute venules ; this is strictly confined to the line of pressure. (b) A diffuse response due to relaxation of the strong arterioles producing a wide surrounding flush or "flare." These reactions occur on all normal skins.

Now in certain individuals these are followed by swelling of the skin, i.e. local cedema or "whealing." This constitutes *factitious urticaria* or *dermographism*. This whealing produced by pressure or slight trauma is often looked upon as pathological, but the passage from the physiological to the pathological in this respect is gradual ; there is no dividing line. In young and perfectly healthy people whealing of the skin to firm stroking is not uncommon, a detectable swelling being found in about one-fourth of those tested, though a conspicuous wheal only occurs in about 5 per cent. The full reaction is, therefore, only pathological in degree, as a wheal can be produced on the skin of almost any normal subject by repeated stroking (6 to 10 strokes). The full reaction to stroking, namely, local



vaso-dilatation, the flare and local oedema, constitutes the triple response. The same reaction may follow a blow, prick, scratch, cold, heat, galvanic and faradic currents and the inoculation of a large number of irritant substances. The reactions of the skin to all these different stimuli, though varying in certain details, are all fundamentally alike, all giving the triple response. The difference in details is mostly due to variations in the strength of the stimulus and its rapidity of action. This similarity of response is remarkable. It assumes even greater significance when it is shown, as it has been, that the three essential parts of the triple response are independent of each other. Thus the flare is called forth through nervous channels (an axon reflex of the sensory nerves), the local dilatation and the oedema are not. But the two last are also separable by varying the experimental conditions. As regards the oedema, the outpouring of the fluid is not the result of increased filtration pressure; the increased permeability of the vessel wall is not the result of simple stretching, but of an independent change in it. Once this increased permeability is established, the rate at which the fluid is poured out is governed by the rate at which the blood is supplied to the very pervious membrane.

It will now be as well to restate the components of the triple response in a little more detail. It consists of : (a) a primary and local dilatation of the minute vessels of the skin, independent of innervation; (b) a widespread dilatation of the neighbouring strong arterioles (flare) brought about entirely through a local nervous reflex; and (c) locally increased permeability of the vessel walls (oedema or wheal). Thus the complete reaction is a very complex one comprising three mutually independent effects. Such a complex and constant reaction could not be brought about by such a variety of agencies, unless there were some *common intermediate mechanism*. This is to be sought in the tissue

damage, the killing of the skin cells. Now Lewis's experiments have proved that the triple response must be due to some diffusible fluid which must be derived from the damaged cells.

There is much evidence that this fluid is histamine. Histamine is the amine produced when carbon dioxide is split off from histidine, a substance occurring naturally in the body and a protein derivative. It has been extracted from the mucous membrane of the gut and from liver and lung. A similar or identical base has been isolated from ergot and it has been prepared synthetically. If a drop of histamine, 1 in 3,000, is placed on the skin and a prick made through it, the fluid being then wiped away, a perfect triple response is evoked. The following facts further support the hypothesis that histamine is the responsible substance. The action of larger doses of histamine, introduced into the general circulation, produce profound effects of a very similar kind to those witnessed after extensive injuries of the tissues, such as shock, following burns. In a condition of shock the main phase is characterized by a fall of blood-pressure. There is a relative emptiness of the heart, arteries and veins; but they are not dilated. The loss of volume is due to escape of plasma, the blood remaining in circulation being over-rich in corpuscles. It is due to dilatation of the minute vessels and an increase in their permeability.

There are certain conditions in which urticaria and shock symptoms occur together—namely, serum sickness and classical experimental anaphylaxis. The pathological symptoms which occur in anaphylaxis have been proved to be due to the interaction of antigen and cell-fixed antibody. This interaction damages the cell to which the antibody is fixed, with the resultant production of histamine. The antibody production is the result of sensitization. It has further been demonstrated that the so-called idiosyncrasies, as far as they are expressed by urticaria, are also dependent upon

antigen-antibody interaction, even in the case of antigens which are not proteins but drugs or other chemical substances. Idiosyncrasy is a state in which an individual is intolerant to a substance to which the great majority of people are tolerant. This intolerance is nearly always, if not invariably, acquired as a result of sensitization. It is very difficult to prove that such a reaction ever occurs as a result of a first contact. That urticaria provoked, for instance, by egg, fish or pollen depends on the elaboration of an antibody, can be shown by Prausnitz-Kuestner's method of passive transmission (referred to as P.-K. reaction). If the serum or citrated blood of an idiosyncratic patient is injected intradermally into the skin of a normal individual the subsequent administration to the latter of the specific antigen whether intradermally or by mouth, will provoke a wheal at the site where the idiosyncratic blood or serum was injected and not elsewhere. This reaction is quite specific. In nearly all cases where the P.-K. reaction is present the idiosyncratic patient's own skin gives a strong, immediate reaction to inoculation with the antigen. This is urticarial in character and corresponds to Lewis's triple response. The antigen need not be a protein; in a case of codeine idiosyncrasy Low obtained a positive skin test. Even in those cases where the primary antigen is of protein nature, e.g. egg-white or fish, positive skin reactions and positive P.-K. reactions can be obtained by dialysates of these substances, which give none of the tests for the presence of protein.

When a person becomes sensitized to a substance he may react to it in different ways, for example, urticaria, eczema or asthma. The reaction type depends partly on the situation of the cells holding antibody, and this in turn depends partly on the nature of the antigen, e.g. primula attacks the epidermal cells, leading to eczema, pollen attacks the respiratory tract, leading to hay-fever and asthma, while aspirin and antipyrin

attack the cutaneous vascular apparatus, leading to urticaria. Ascaris extract or emanation, which can produce urticaria in 80 per cent. of adults, never produces eczema. On the other hand, primula never produces urticaria. Partly it depends on the mode of entry: e.g. pollen normally causes hay-fever because it is inhaled, but if it is introduced into the skin of a sensitive patient urticaria results. Partly it depends on the individual. For instance, camomile, which to the vast majority is quite innocuous, will produce eczema in one idiosyncratic and urticaria in another. In the same individual the different organs may be quite independent in their sensitiveness, e.g. a patient may give a positive skin test to pollen without having hay-fever, and *vice versa*, though it is uncommon. Even the separate layers of the skin may differ in their sensitiveness. In cases of eczema it is the epidermis which is sensitized, and in urticaria it appears to be the deeper layers, perhaps the vascular endothelium in the cutis. At any rate, to evoke an eczematous response in a patient who reacts in this way to a substance, it is only necessary to lay the antigen on the unbroken skin. To evoke an urticarial wheal it is necessary to introduce the antigen by intradermal injection or scarification.

#### PREDISPOSITION

Though the actual mechanism of urticaria has, in some instances, become much clearer, we still do not know how certain individuals have a greater liability to become sensitized than have others. This tendency or liability is, to a large extent, familial. These families often have symptoms, such as vasomotor instability, which older observers would have summed up under the term "neuropathic." Perhaps there is an underlying deficiency of tone in the sympathetic or the endocrine glands which act with it, for the drugs which are most efficient in suppressing an

urticarial attack are chiefly those which either stimulate the sympathetic or depress the parasympathetic, such as adrenalin, pituitrin, atropine, thyroid and ephedrin.

The predisposition to become sensitized is not confined to any particular class of antigens. A predisposed individual during his lifetime generally becomes sensitized to a large number of different substances. But the predisposition to get urticaria from the other kinds of agencies (i.e. other than antigen-antibody interaction) is quite independent. Thus in a dermographic patient there is an abnormal sensitiveness to trauma and trauma only. The cells of the skin are damaged, so that they set free histamine, by very slight injuries, such as a firm stroke; but there is no *general* increase of urticarial reactivity, so that if histamine is pricked through his skin it does not produce any greater reaction than in a normal individual. He is, therefore, not abnormally subject to urticaria from other causes.

#### GENERAL ETIOLOGY

We have seen that urticaria can be brought about by trauma, other physical and mechanical agencies and by antigen-antibody interaction. With regard to the last, the source of the antigen is more often internal than external. A frequent source is the intestine. The antigen may be some moiety of the food, especially incompletely digested protein, or a product of bacterial decomposition or bacteria themselves. For, just as drugs like aspirin, antipyrin and quinine have their individual pharmacological action, and in addition can produce the common reaction type urticaria in individuals sensitized to them, so bacteria which have their individual pathogenic effects can also produce urticaria in sensitized individuals. Therefore all foci of infection can act as causes. I have several times seen attacks of urticaria recur, each time in association

with a sore throat.

Often the antigen appears to act indirectly by producing an intermediate or secondary antigen. There is excreted in the urine of the majority of people a substance like a proteose which has been isolated by Oriel. He says that it is found in greater quantity in those suffering from urticaria and other allergic manifestations and especially during the attack. He states that it often gives a positive skin reaction in the patient from whom it was derived, but not in others. Further, the proteose of a milk-sensitive patient can sensitize a guinea pig against milk and, conversely, milk can sensitize a guinea pig against proteose of a milk-sensitive patient. It appears, then, that the antigen is excreted with, and incorporated in, the proteose. In a patient, quoted by Oriel, who developed severe urticaria on taking aspirin, the following interesting facts were found: Between attacks neither aspirin nor his proteose gave a positive skin test; after taking aspirin and the outbreak of the usual urticaria, his proteose did give a positive skin test, but aspirin still did not; the proteose now also evoked a reaction in the skin of other aspirin-sensitive patients. This shows that aspirin, at any rate in this instance, did not act directly on the skin, but only through forming a secondary antigen by combination with the proteose. This may be one explanation of the unreliability of skin tests in the detection of responsible antigens.

So far, however, this proteose theory of Oriel and his findings have not been corroborated. As Freeman points out, the crux of the matter lies in the alleged *specific* dermal reaction of this proteose. If specific it is of the greatest importance in immunology, but if not it has no significance. Freeman, even with Oriel's active co-operation, was quite unable, at any rate as regards asthma and hay-fever, to confirm (*a*) the presence of proteose in any greater quantity in the

urine of allergic patients than in controls, (b) that proteose prepared from the urine of asthma or hay-fever patients gave a specific reaction in their skins, whether taken during quiescent periods or periods of exacerbation. Norman Burgess has also been unable to confirm the specificity of proteose in cases of urticaria.

Acidity sometimes seems to be a cause. It can be brought about by physical exertion and, in certain cases by prolonged sweating. In one patient whose attacks of urticaria invariably followed profuse sweating it was shown that the sweat remained acid for a much longer period than in normal controls. It was further demonstrated, experimentally, that her skin reacted by whealing to buffer solutions of a pH which corresponded to that of her sweat, whilst the skin of controls did not. Nervous and emotional shocks are the immediate precursors of outbreaks in some over-excitable patients, and appear to be the only cause; the mechanism is not understood. All forms of urticaria are aggravated by big changes of temperature.

#### TREATMENT

In view of the very varied etiology it is essential to take a very careful and detailed history. After as far as possible excluding external influences, steps must be taken to remedy intestinal stasis and infection and remove other infective foci. The question whether or not the diet is directly to blame can be settled as follows. The patient is first kept for about a week on a strict milk diet. After that a full and varied diet is given, but with the complete exclusion of milk and its derivatives. If this procedure has no effect on the urticaria, no specific food can possibly be etiologically responsible. It is still possible that the trouble arises from a product of incomplete digestion of protein. This can be combated by giving digestive tablets, such as panteric (Parke Davis) or anzypan (Napp). Kaolin may also be of value in preventing the absorption of

toxic substances. In urticaria associated with physical exertion or sweating the indication is for alkalis, which are also useful at the onset of certain other rhythmic types of urticaria. In purely nervous cases luminal, about gr.  $\frac{1}{2}$  t.d.s., has been found effective. Acute attacks can generally be relieved by injection of adrenaline, 1 in 1,000,  $\frac{1}{2}$  c.cm. Thyroid, ephedrine, and pituitary extract are also useful. In those instances where a definite antigen is detected the obvious treatment is to eliminate it, if that is practicable. If it is not practicable, one might hope to achieve a cure by specific desensitization. This nearly always fails. There are, however, various methods of non-specific desensitization which are of very great value. The most useful is auto-hæmotherapy. It is specially useful where the cause is entirely obscure. Blood is taken from the patient's vein and injected intramuscularly in the gluteal region once a week. The first dose should be 5 c.cm., the second  $7\frac{1}{2}$  c.cm., the third 10 c.cm., and the fourth 10 or 15 c.cm. Generally three or four injections are enough. If they have not produced obvious improvement, further injections will not help. Other substances which have been used for this purpose include preparations of milk, such as aolan given intramuscularly, peptone intravenously, or sodium thiosulphate intravenously. Magnesium hyposulphite has also been recommended, but I have not seen good results. Calcium gluconate given intravenously or intramuscularly sometimes produces striking temporary improvement, but it is generally of short duration.



# Some Recent Work on Psoriasis

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THIS disease remains the great dermatological mystery among the commoner affections of the skin. Notwithstanding the efforts of numerous workers the real nature of the complaint still baffles us and we must be thankful that we are able to chronicle a number of small but useful additions to our knowledge of the subject during the last few years, which have been useful both in enabling us to comprehend somewhat more clearly the histo-pathology of psoriasis and also have been of assistance in expediting the treatment of the numerous patients who are afflicted by it. Some years ago a very well-known dermatologist, now dead—one who was vitally interested in *THE PRACTITIONER*—remarked to the writer that the only consolation he had for having given up active practice was that it was no longer necessary for him to administer spiritual consolation to psoriatics. It must be confessed that the situation has not greatly changed since his time, but we can claim that certain useful modifications of treatment are now at our disposal which were not then available.

Although in typical cases the diagnosis of psoriasis is absolutely obvious, it is universally recognized that great difficulties may arise in differentiating it from either lichen planus on the one side or seborrhœic eczema on the other. Good work has been done on this subject by the French school of dermatology, in which Brocq, up to the time of his death, was pre-eminent, and their results were well summarized by

Civatte in an address which he gave before the Dermatological Section of the Royal Society of Medicine.<sup>1</sup> Civatte pointed out that great assistance in differentiating true psoriasis from those squamous dermatoses sometimes designated "seborrhœic eczema," "seborrhœoids" or "parakeratoses"—a task often extremely difficult from naked eye examination alone—could be obtained from microscopic examination, whereas in psoriasis the microscope shows that the typical silvery scale consists of superimposed lamellæ formed of horny nucleated cells, while below the stratum granulosum is absent or at least reduced to a few islets of granular cells. Keratinization is extremely imperfect, there are no kerato-hyaline cells at all, and thus the parakeratosis which is the most striking histological feature of psoriasis is produced. In places masses of shrivelled polynuclear leucocytes are found and the whole rests on a rete mucosum with elongated interpapillary portions. Here and there masses of leucocytes may be seen arranged in ill-defined cavities under the scale, and these masses have been termed the "micro-abscess" of psoriasis. The mass is formed by polynuclear leucocytes, which may be placed in their migration through the rete mucosum. Sabouraud considers that the "micro-abscess" is the elementary histological lesion of psoriasis. Now in "seborrhœic eczema" or one of the "parakeratoses" even when to naked eye examination the lesion closely resembles a patch of psoriasis, the salient histological feature is inter-cellular œdema, which separates the cells of the Malpighian layer and stretches the inter-cellular filaments. This condition is known as spongiosis. In the enlarged intercellular spaces mononuclear cells (lymphocytes), not polynuclear leucocytes, insinuate themselves in small numbers. Very shortly, polynucleosis as against mononucleosis is the distinguishing microscopical feature of psoriasis as against the lesions of "seborrhœic eczema" and

“parakeratoses” which mimic it clinically.

This rather difficult microscopical diagnosis of psoriasis is possessed of considerable practical importance because upon it depends the prognosis of the individual patient, for while we cannot, alas, promise a permanent cure of psoriasis, appropriate treatment will effect this without a great deal of difficulty in those other conditions in which the clinical picture is so similar while the pathological picture is so profoundly different. This work has also an important scientific significance, for it provides a strong argument against the dermatologists who are inclined to think that psoriasis, seborrhœic dermatitis and the seborrhœids are all modifications of what is essentially the same pathological transformation of the epidermis.

While the etiological problem of psoriasis remains unsolved it is unreasonable to expect that the treatment of the condition can be put on a satisfactory basis, but something has been done to strengthen the hand of the practitioner during recent years. Attacking the disease from its constitutional aspect efforts have been made to apply the principles of “protein shock” to this problem. It has long been noticed that in patients who develop a high temperature the eruption usually disappears, and attempts have been made to obtain the same result by the injection of such bodies as T.A.B. (administered by the intravenous route), sterilized milk and certain sulphur compounds, but it cannot be said that striking results are often obtained. In all probability the reason is that it is very difficult to maintain in healthy people (and sufferers from psoriasis are usually healthy enough in other respects) a sufficiently prolonged elevation of temperature to produce the desired result. Perhaps the most important new preparation introduced for the treatment of psoriasis in the last few years is colloidal gold, which we owe to Dr. Noxon Toomey, of St. Louis, U.S.A. He originally employed the fluid

commonly used in a laboratory for the Lange colloidal gold test of the cerebro-spinal fluid. This contains 0.031 grams of metallic gold per 100 c.cm., and he gave it in doses of 2 to 4 teaspoonfuls three times a day, but subsequently he used a stronger solution, or, rather, suspension of gold made by dissolving gold tribromide in bromine water and subsequently driving off the bromine by means of very gentle heat. For the details of the preparation of this re-agent the reader is referred to Noxon Toomey's article.<sup>2</sup> The author claimed that all the cases treated by colloidal gold improved without exception, and this although it was permitted to act entirely unsupported by other methods of treatment either internal or external. At the time he published his paper he had treated over 20 cases. He also says that treatment by gold, given by the mouth, is quite free from unpleasant complications, and is not, as one might expect, expensive. It may also be added that other dermatologists have employed gold in the form of sanocrysin in the treatment of psoriasis, but the reports are not very encouraging.

Attempts have been made by various workers to treat psoriasis on dietetic principles. Twenty years ago Duncan Bulkley<sup>3</sup> preached with great vigour the efficacy of a strict vegetarian regime in the cure of the disease. He permitted neither milk nor eggs to his patients and claimed very good results. The severity of the method, however, was a great drawback, and other dermatologists who attempted conscientiously to follow his instructions were unable to confirm his results. Consequently the vegetarian regime as a specific for psoriasis has long since fallen into disrepute.

Latterly Levin and Silvers have published a preliminary report<sup>4</sup> on the treatment of psoriasis by means of a salt-free diet. It is perhaps cynical to remark that salt-free diets have become fashionable in

therapeutics during the last few years, but these workers point out that in psoriatics there is a decided tendency to a concentration of the chlorides in the sweat to a higher figure than is normal, while the psoriatic lesion itself does not sweat at all. For this reason they state they decided to try a salt-free diet in psoriasis. They gave a diet consisting mainly of vegetables, fruits, cooked cereals, cream, salt-free bread, cottage and cream cheese, fish, occasionally lamb chops, coffee and tea. All the cases treated were confined to hospital, the only auxiliaries to treatment were sweat baths (which we presume mean Turkish baths) and local application of cold cream or boracic acid ointment in order to keep the skin comfortable. The first three patients so treated had all suffered from obstinate forms of the disease which had resisted the usual methods of treatment but which yielded completely to the regime indicated within two months, and the authors report that all the other patients now under observation are doing well, but they emphasize the necessity for strict supervision.

To some extent Levin and Silvers were inspired in their attempt to treat psoriasis dietetically by previous work on the metabolism of psoriatics published by van Kerckhoff<sup>5</sup> and Gans.<sup>6</sup> Kerckhoff pointed out that one unfailing characteristic of a patch of psoriasis was a complete absence of melanin in it. Now melanin is formed in the normal skin by a process of oxidation within the lowest layers of the epidermis from easily oxidizable substances—the pre-pigments. Clinically one may observe an illustration of this absence of pigmentation in any case of psoriasis in which rapid disappearance of the lesion has been brought about by vigorous treatment with chrysa-robin. The sites of the cured patches are always perfectly white and stand out as pale islands in a pigmented expanse for a few days before the normal oxidative processes are re-established and provide the

usual amount of pigment.

Another argument in favour of the theory that there is a slowing up of the oxidative processes in psoriasis is to be found in the action of certain remedies for the condition—namely, dioxy-benzol and dioxy-anthranol, which can only be explained on the supposition that they cause a sensible increase in the rate of oxidation. Gans<sup>6</sup>, on the other hand, has shown that in areas of skin affected by psoriasis there is a tendency for the tissue reaction to swing further towards acidity than in the normal skin. He has been able to demonstrate this by the behaviour of fresh sections towards neutral red dye. This colour is destroyed the more quickly it comes in contact with an alkaline body. Since psoriatic patches remain dyed by it longer than normal skin, it follows that in psoriasis the reaction of the tissues is less alkaline. This demonstration accords with van Kerckhoff's observation that the processes of oxidation are slowed down in patches affected by psoriasis, for oxidative metabolism is slower in an acid medium. A further question now arises as to how far the tissue acidification with consequent inhibition of oxidation is to be ascribed to stagnation in the capillaries, an observation made long ago by Unna and frequently confirmed since. Van Kerckhoff has attempted to increase the oxidative capacities of the epidermal cells by the application of compounds of manganese, which have the property of greatly increasing the oxidizing power of oxidases. His results have not yet been published, but it is stated that he has obtained distinct improvement in many cases of psoriasis.

On the assumption that the acid products of metabolism were constantly discharged into the damaged tissue from the blood, Gans attempted to diminish their effect by daily doses of sodium bicarbonate, but quite without success. Subsequently he tried the administration of ammonium chloride on the chance

that the concentration of acidity in the skin left the remainder of the organism with a tendency towards "alkalosis." But the results of giving this compound were unexpected and startling, for in all cases it was followed by a marked increase both in the extent and the severity of the eruption and its use had to be abruptly discontinued. On the other hand, these detrimental effects do throw a certain light upon the pathogenesis of psoriasis, for they show the importance of the disturbance of the normal acid-alkaline balance in its production, a point which may ultimately be turned to therapeutic advantage. Indeed, it is possible that in the limitation of the sodium chloride intake Levin and Silvers have found a means of controlling the tendency of the psoriatic subject towards the excessive production of acid in the skin; and the subsequent progress of their efforts in this direction, which are still too recent for either confirmation or contradiction, by their repetition on the part of other workers will be awaited with interest by dermatologists.

Meanwhile the older and more conventional methods of treating psoriasis by various external applications still hold the field. Nothing has yet been discovered for the dispersal and removal of an obstinate and severe outbreak of psoriasis other than intensive inunction with chrysarobin ointment as strong as the patient can stand without the production of a severe inflammatory reaction. In a strength of a drachm to the ounce of vaseline, vigorously rubbed in twice daily, with the patient kept in bed, this drug will almost always remove a crusted and persistent eruption within three weeks. Its disadvantages, however, are very considerable and are well known. Not the least of these are the staining and ruination of the bed and underlinen, and unless the patient is able to consecrate the necessary time wholly to the purpose and remain confined to bed during the treatment, it is better to avoid the use of chrysarobin altogether and

to employ other and less objectionable substances. Recently Messrs. Bayer have introduced a preparation known as cignolin, the chemical name of which is di-oxy-anthranol and which they describe as chrysarobin minus a methyl group, for which they claim results equal to those obtained from chrysarobin without its disadvantages. It certainly possesses but little of the pigmentary power of chrysarobin and appears to give good results without the necessity of confining the patient to bed. It may either be made up into an ointment in the usual way or employed as a paint, dissolved in chloroform. As stated above, its effects are due to its power of increasing the intensity of the oxidative processes which take place in the epidermis. The same explanation is also true in the case of ultra-violet light, which has of recent years been much in vogue as a treatment for psoriasis. There is no doubt of its effect in some cases and it has the advantage that it is a clean and pleasant form of treatment and most patients enjoy light baths. Apart from these conveniences it is not, however, so generally effective as chrysarobin, and like it, it only acts locally. It has no constitutional power of preventing the outbreak of an eruption although it does seem to restrain the appearance of lesions on those parts which are regularly exposed to its effects.

Illustrating this I may mention the case of a lady who while actually enjoying a season's sunbathing at a Mediterranean resort was attacked by psoriasis for the first time in her life, but while she was still frequenting the beach no lesions appeared except on the area of her skin actually covered by her bathing costume. Even the narrow shoulder straps were sufficient to nullify the inhibitory action of the sun on the disease and their position was marked by a line of typical spots of psoriasis "*en goutte*." On returning to this country the psoriasis spread to the limbs and neck.

It is, too, a matter of common knowledge that sufferers from psoriasis are often less affected by their infirmity when resident in hot climates, where there is more temptation to exposure of the cutaneous surface to the elements than there is in this country. But it



is important to remember that in all forms of light treatment it is essential that there should be produced an *active* hyperæmia of the skin, not a *passive* hyperæmia or stagnation of the blood in the capillaries, a state of affairs which is always detrimental to the physiological functions of the skin. Hence those who reside in hot climates should try to get the benefit of light rays without overheating the skin and without the production of an inflammatory erythema. Moreover, it is probable that very hot baths, especially if prolonged immersion is permitted, are to be avoided by those who are liable to psoriasis. The stagnation in the capillaries which is a constant feature of the blood-flow through the psoriatic patch must be encouraged by such treatment, while it seems very likely, although I do not know any proof of it, that general cutaneous hyperæmia and consequent general capillary stagnation produced by a hot bath would encourage the spread of the eruption to other parts.

For the present, then, we must rely in our efforts to control psoriasis by our well-tried remedies, reinforced by the more recently introduced di-oxy-anthranol (or cignolin), while encouraging our patients to expose themselves as much as possible to ultra-violet light derived either from the natural sun or from artificial sources, and hope that research on biochemical lines will soon give us more help in unravelling the pathogenesis of this baffling disorder and enable us to relieve more effectually the numerous patients who suffer from it.

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# Eczema

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ECZEMA is not a disease: it is a reaction of the skin of a special type, which is brought about by an infinite variety of causes. It is the commonest of all cutaneous reactions, and probably the most universally recognized. Although a diversity of clinical forms exists, its morphological characteristics, both clinical and histological, are on the whole well defined and the diagnosis is not often difficult. The diagnosis of eczema without an accurate grasp of most if not all of the factors concerned in its development is, however, useless. At the present time, owing to the gradual accumulation of valuable clinical and experimental observations, the etiological factors in eczema are far better known than they were a generation ago. Above all it is recognized that there must be a special predisposition, whether inborn or acquired, to react in the form of eczema to one or a number of causal factors. But it must unfortunately be admitted that a great number of important questions concerning the condition remain unanswered.

In this article an attempt will be made to lay special stress on the nature of these unsolved problems and on the more important of the established facts concerning the etiology and pathogenesis of eczema. To avoid confusion it is advisable to approach the subject from three distinct angles, namely the clinical manifestations and histology, the etiology, and finally the pathogenic mechanism of eczema.

## CLINICAL MANIFESTATIONS AND HISTOLOGY

These are so well known that a very brief description of them will suffice. Eczema may be found associated

with one or several of the following : erythema, œdema of the skin, vesiculation, weeping, crusting, desquamation and lichenification. These changes may succeed one another in stages or may co-exist ; or one phase may alone be present or may predominate.

It is highly important to preserve an accurate mental picture of the histological changes present in eczema ; which, as Darier points out, merely brings the direct examination under closer observance than is possible with the naked eye or lens. To quote from Darier's admirable description : the distinguishing feature of eczema and peculiar to it is spongiosis.

This consists of an intercellular infiltration of plasma in the Malpighian body as the result of which the Malpighian cells are separated one from another and deformed. Although at first preserving their filaments of union these eventually rupture ; spongiosis is dispersed in little foci more or less closely aggregated, in the centre or towards the edges of which may be seen little spaces deprived of cells ; these are microscopical vesicles. The large vesicles of eczema visible to the naked eye result from the distension of these foci and the inflation of the smaller vesicles and are usually more or less loculated. The fluid is derived by a process known as exoserosis from the subjacent capillaries, and in the vesicles and among the Malpighian cells are found a variable number of migrating lymphocytes ; the vesicles may also contain detached epidermal cells. When secondary infection of an eczema takes place polymorphonuclear leucocytes become added to the migrating lymphocytes.

To spongiosis and vesiculation is secondarily added acanthosis, or multiplication of the Malpighian cells leading to increase in the depth of the epidermis, particularly in the interpapillary portion ; and parakeratosis, or failure of the Malpighian cells to keratinize in the normal way so that the superficial cells retain their nuclei. These imperfectly keratinized cells lack the resistant quality of the normal horny layer and become desiccated as the result of exposure to air and form the desquamated scale of eczema. The dermal lesions consist of vaso-dilatation, œdema, and infiltration with mononuclear cells disposed around the cutaneous vessels.

*Clinical varieties.*—In acute eczema, vesiculation on an erythematous and cedematous base is generally present ; in subacute and chronic eczema the greatest variety of clinical forms is found. Some are predominantly weeping and crusted, others dry and scaly. Such terms as vesicular eczema, erythematous, weeping, impetigenous, crusted, keratotic, papular, papulo-

vesicular and lichenified eczema explain themselves. They are applied to different phases of eczema and have no etiological significance.

The clinical varieties of eczema are also named after their configuration and regional distribution, and the terms intertriginous, nummular, flexural, generalized, and dysidrosiform eczemas are employed often for the better definition of the various types. The configuration and distribution of eczema generally give some indication of the causal factors. Thus eczema of the hands and forearms suggests an occupational or at least an external exciting cause. Acute erythematous eczema of the face suggests that the cause may be a volatile irritant, or that the patient may be sensitive to physical stimuli such as sun or wind.

In intertriginous eczema of the large folds in an obese subject, intertriginous friction and hyperidrosis may be the important factors, or these factors may provide a suitable soil for mycotic or microbic infection. An intertriginous distribution, whether the large or small folds be affected, suggests an infective origin. An intertriginous streptococcal infection often forms the starting point of eczema in the neighbourhood of the postauricular folds, the labial commissures, the angle of the nares, the canthi and perianal region.

Chronic flexural eczema with lichenification is most often found in cases belonging to the eczema-asthma group, and is then often associated with other features common in this variety, such as a family history of asthma or eczema, or related allergic diseases, a history of eczema in infancy, or asthma or hay fever and of alimentary or cutaneous sensitivity to various food-stuffs. An earthy complexion, and a peculiar mask-like rigidity of the features are generally present in severe cases. In dysidrosiform eczema the possibility of mycotic infection should be considered, though this variety may also be provoked by external irritants, by simple hyperidrosis, or form part of a more widespread

eczema.

Nummular papulo-vesicular eczema is a special variety which appears most often on the thighs, arms, and forearms, but which may sometimes have a generalized distribution. It may occur as the result of auto-sensitization from a chronic patch of eczema, or it may be of toxic origin.

Eczema of the scalp is usually infective; it may complicate impetigo or the scalp may be invaded by impetigenous eczema affecting primarily the post-auricular folds. Primary seborrhœic eczema is also common on the scalp.

Eczema of the face in infancy may be caused simply by external irritants, or many complex factors may take part in its development, including an inherited allergic diathesis. As in older children eczema of the scalp in infancy may be of infective origin. Eczema of the napkin area is usually due to the irritant action of fæces and urine, though occasionally to thrush infection.

Seborrhœic eczema is a special type, the primary lesion of which is a dry red perifollicular papule of about the size of a pin's head, or a group of papules. In the course of days the lesion spreads centrifugally, always by the formation of new papules; while the original papules disappear to give place to superficial scales, usually fawn coloured, and greasy to touch. Seborrhœic eczema is closely related to dandruff and is found principally on the scalp, the chest and interscapular regions. The fact that this condition is undoubtedly a variety of eczema has been demonstrated histologically by Civatte. There are several clinical varieties of seborrhœic eczema, including a rare generalized erythrodermic form, which cannot be described here.

#### ETIOLOGY

The causes of eczema are predisposing and exciting. Among general predisposing factors the most important is heredity. The patient is a member of a family of

whom one or several members have suffered from one or more of the manifestations of group sensitivity or allergy, especially eczema, asthma, hay fever, and urticaria. Among other predisposing factors faulty hygiene, alcoholism, overwork, nervous exhaustion, digestive disturbances, constipation, chronic colitis, pregnancy and lactation, the menopause and diabetes may be mentioned; but the rôle of these factors, though undoubtedly of great importance, is not at present capable of more than vague definition. No constant alterations in the excretory functions of the organism, the nitrogenous and carbohydrate metabolism and the acid-base equilibrium in the blood have been found in eczema. On the other hand, obesity, seborrhoea, hyperidrosis and varicose veins are local predisposing causes which have direct relationship to the eczema with which they are sometimes associated. Local predisposition may also be brought about by prolonged exposure to an irritant or by manual work, especially in wet occupations.

The exciting causes are classified as external or internal, the latter reaching the skin by way of the blood stream through the digestive apparatus and, perhaps, sometimes through the metabolism of the subject. They are innumerable and infinitely varied; every one would, perhaps, be eczematous were not these causes effective only in subjects predisposed to react against them in the form of eczema. The great majority of eczematous irritants are, in fact, normally harmless substances, and are eczematogenous only for patients with exalted sensitivity towards them.

*External causes.*—In discussing external causes it is necessary to distinguish clearly between eczema and what may properly be regarded as dermatitis. The word dermatitis is often applied to all cases in which a known irritant is the chief causal factor. Those who try to distinguish between eczema and dermatitis in this way separate from eczema all cases in which the

exciting cause is known, including those in which contact with the irritant is brought about through occupation, those provoked by physical stimuli such as sunlight and cold wind, by substances, such as drugs and foodstuffs, which reach the skin through the blood-streams, by infections of the skin such as impetigo, streptococcal fissures, varicose ulcers and other septic lesions, and by certain ringworm infections. They reserve for eczema only these cases in which a marked hereditary or acquired predisposition to eczema exists or in which the exciting causes are unknown, and they claim that, in due course, when the etiology of all varieties of eczema is known the term will be eliminated altogether. This attitude is unsatisfactory because it is obviously useless to employ different names for the same process; one must dispense with either eczema or dermatitis; moreover, the word dermatitis seems to imply a simple inflammatory reaction rather than one as complex as eczema.

If an acid or alkali in suitable concentration, or any normally irritating substance, be applied to the skin, an inflammatory reaction comparable to a first degree burn, consisting of erythema and perhaps vesiculation, will follow. This is a normal reaction and it will subside after the removal of the irritant. The same substance may in a sensitive subject produce a severe reaction even when applied in high dilution, and the reaction may spread beyond the area to which the irritant was applied and persist for a long while after its removal. In such cases the reaction generally presents the clinical and histological features of eczema. The term dermatitis should be reserved for the former reaction, and though it may at times be difficult to determine the point at which dermatitis ends and eczema begins, the distinction is, as a rule, fairly obvious. But the most important feature of eczema as opposed to dermatitis is that the irritants which provoke it are almost always harmless to normal subjects.

The external eczematogenous substances include antiseptics such as lysol, phenol, picric acid, formalin, iodoform, iodine, sulphur, mercurials; camphorated liniments and other stimulating substances used in external therapy; aniline dyes, especially paraphenylenediamine, used for dyeing hair and fur; tetrachlorethyl, amyl alcohol, lime and cement, french polish, turpentine, potassium bichromate, sugar, flour and dough, crude oil, paraffin and petrol, soda, and soap and water. The emanations of various plants, especially primula obconica, rhus toxico-dendron, chrysanthemum, tulips, anemones, clematis and other flowers, hops, teak wood and sandal wood. These are a few of the better known external eczematogenous irritants; there are hundreds of others and their number is constantly increasing with the growth of industrial science. It is possible sometimes to gain valuable information regarding the external causal factor in eczema by means of what are known as patch tests. In these one or a number of suspected substances are applied for from one to twenty-four hours under occlusive dressings to unaffected portions of the skin, preferably in the neighbourhood of the affected areas. A positive reaction consists of erythema or of erythema with vesiculation. It is important to remember when applying these tests that certain eczematogenous substances such as lime, turpentine, formalin and some others are normally somewhat liable to irritate the skin, and they should be applied either in high dilution or for very short periods. On the other hand, such substances as flour, sugar, flowers and teak sawdust, which have normally no irritant properties, should be applied for twenty-four hours.

*Internal causes.*—Of these certain drugs, notably quinine, the salvarsan derivatives and gold compounds are well-known examples. Certain types of foodstuff, especially those which may cause urticaria, occasionally give rise to eczema. In infancy cow's milk is an



occasional though rare cause of eczema.

Probably the most important blood-borne irritant in eczema is a substance of autolytic origin derived by a process described by Whitfield as auto-sensitization from a lesion in the skin itself. Whitfield observed this process first in the case of a man with acute vesicular eczema of the legs, whose serum in trickling over the healthy skin produced a row of eczematous vesicles. He further expressed the opinion that the very common class of case in which a generalized eruption followed the rubbing of a single chronic patch of eczema, such as varicose eczema, was analogous; in these, new patches first appear in the neighbourhood of the original patch, then a generalized patchy erythema, becoming eventually a scattered papulovesicular eczema. He considered that both conditions were due to the absorption of the patient's own broken-down tissue products. Whitfield attributes the extreme chronicity of many cases of eczema to auto-sensitization. (*See also* p. 219).

#### PATHOGENESIS

That sensitivity in eczema resides in the epidermis was first demonstrated by Bloch and Peter, who grafted the skin of a subject sensitive to iodoform on to a normal subject. They found that the graft remained sensitive to iodoform whether this substance were applied directly or taken internally, while the rest of the skin remained insensitive. Bloch regards eczema as essentially an allergic process. According to his conception, allergy is based on the property of certain cells or organs of the organisms to react in a specific manner when brought in contact with a substance which as far as is known is foreign to it. The specific pathological process which results from this contact is the result of the reaction of the substance with its antibodies fixed in the cells. This conception brings eczema into the line with anaphylaxis, urticaria,

asthma, and hay fever, and with the majority of microbic and mycotic infections. Unfortunately, while in the majority of these conditions the presence of antibodies has been demonstrated in the blood stream, and while in the case of anaphylaxis and urticaria it is possible to transmit passive sensitivity to a normal subject, it has so far proved impossible to demonstrate the existence of antibodies or to transmit passive sensitivity in the case of eczema. Bloch explains the absence of demonstrable antibodies in eczema by supposing that while in urticaria there is always an overflow of antibody into the general circulation, in eczema the antigen is all fixed in the epidermal cells.

*The eczema-asthma complex and the idiosyncratic eczemas.*—By their close relationship to asthma, hay fever and urticaria, these must be regarded as allergic reactions of the epidermis to one or a number of irritant substances. By sensitizing normal subjects to *primula obconica*, and subsequently producing eczema in them by simple application of this plant to the skin, Bloch has succeeded in establishing the identity of idiosyncratic and acquired sensitivity.

*Occupational eczema.*—Oppenheim believes, on the other hand, that allergy is the basis of eczema in rare instances only. He has drawn attention to the fact that water which has no antigenic properties is the most important cause of professional eczema. The constant damage over long periods to the protective horny layer of the skin in all wet occupations eventually leads to the breakdown of the resistance of the skin to all kinds of irritant substances.

*Eczema due to physical causes.*—It would appear equally difficult to accept allergy as the basis of eczema excited by a purely physical stimulus such as sunlight; in such cases, however, the skin may in reality be sensitive not to light, but to an antigen in the blood stream, which only requires the slight mechanical stimulus of sunlight to bring about an intense reaction

between it and the sensitized epidermal cells. In such cases one or more patches of eczema are often found elsewhere on the body, and, in these, sensitivity to climatic stimuli is in reality an expression of the process already described as auto-sensitization. In the absence of a focus on the skin itself the existence of an antigen in the circulation may be assumed in many cases on the grounds of probability.

*Microbic and mycotic eczemas.*—It is doubtful whether pyogenic organisms ever give rise to eczema in the first place; but the primary lesions normally caused by them such as impetigo, ulcers, fissures, boils and pustules are frequently complicated by eczema, which occurs first in the immediate neighbourhood of the septic lesions and often later at a distance from them. It is not certain whether the eczema results from auto-sensitization or from sensitivity to the toxins of the organisms.

In mycotic infections the eczematous reaction is probably due directly to the organism and its toxins. Ringworm infection, especially epidermophytosis of the feet, is the principal example of this type; owing to the absorption of the endotoxin of the fungus the primary infection is often complicated by eczematous lesions at a distance, especially by dysidrosiform eczema of the hands. The existence of sensitivity to the infection may be demonstrated by the intradermal injection of trichophytin as a cutaneous test.

In seborrhœic eczema the primary papule or group of papules appears to be the result of direct infection of the skin with the spore of *Malassez*. The condition is often complicated by diffuse scaly, weeping or crusted eczema, particularly of the scalp, post-auricular folds and the intertriginous folds generally. In these cases the eczema is probably due to auto-sensitization and not to allergic sensitivity to the spore of *Malassez*. It is difficult to account for the predilection for the folds in these and in cases of infective origin in general, and

their precise pathogenesis remains undetermined.

It would appear reasonable to accept allergy as the basis of the majority of eczemas if the term be held to imply, as its originator von Pirquet intended, simply altered or exalted reaction. But it is not yet possible to assume the presence in the epidermal cells of fixed antibody to the irritant to which the epidermis is sensitive, or, as A. M. H. Gray points out, to claim in the absence of any definite knowledge of the chemical and physical changes which take place in the cells in eczema that we have reached bed rock. Darier regards all eczematous processes as a manifestation of epidermal intolerance, and sensitivity as intolerance regarded from a particular angle. Allergy he believes to be probably one of the mechanisms by which intolerance may be manifested, but it is not necessarily the only mechanism.

#### TREATMENT

In practice, it is advisable to consider eczema from the three separate angles that have been briefly discussed. In many cases the chief causal factors may be determined without difficulty by inquiry and by direct observation, as for example in many eczemas of external origin. In these the diagnosis may be confirmed by applying patch tests, and the essential part of treatment is the avoidance of the offending article, combined with suitable local treatment.

In others predisposition to eczema is so important that it may be practically impossible to avoid the various substances which determine an attack. This group includes those cases of occupational origin in which the resistance of the skin, often impaired by hyperidrosis, has been gradually broken down by prolonged exposure to an irritant, or by constant scratching; cases of the eczema-asthma group; many cases of infective origin, notably chronic impetiginous eczema of the scalp in children, varicose eczema and

eczema of the vulva and perianal regions. In almost all varieties of chronic eczema in fact, predisposition may have become too firmly established to eradicate by any means known to us at present. Between these extremes there are many intermediate types, and in these there is often a number of predisposing and exciting factors the relative importance of which may be assessed and a rational therapy devised only after very careful consideration.

*Local treatment : general principles.*—Treatment must be elastic, varying according to the stage of the disease. In the acute erythematous and vesicular stages, in order to facilitate evaporation and drainage of serum and to cool an inflamed surface, it is advisable to use simple watery lotions or watery pastes or occasionally oily liniments containing no antiseptic. Calamine lotion, lead lotion, or calamine liniment may be used for this purpose, or the following watery paste:—

R.	Glycerin	-	-	-	-	-	-
	Liquid paraffin	-	-	-	-	aa	1 part
	Zinc oxide	-	-	-	-	-	-
	Starch	-	-	-	-	aa	5 parts
	Water	-	-	-	-	-	12 parts

to be applied two or three times daily, soaking off with lead lotion before re-applying.

In impetiginous and crusted eczemas accumulated crusts must be removed; this is often best accomplished by liquid paraffin or olive oil, though occasionally it may be advisable to soak off impetiginous crusts with a weak antiseptic, e.g. solution of potassium permanganate  $\frac{1}{4000}$ , or starch and boric poultices, before applying any other remedy.

In the natural course of events the weeping stage of eczema is succeeded by a desquamative stage (parakeratosis). Desquamation results from the desiccating action of air on superficial imperfectly keratinized epidermal cells. Its presence generally indicates a healing stage and protective creams and pastes, which formerly were badly tolerated, are now indicated.

They replace in part the fat which in the parakeratotic phase is lacking in the superficial epidermal cells. When, as the result of repeated scratching, lichenified and indolent infiltrated patches of eczema are produced, it is usually advisable to add one of the reducing agents such as ichthyol, tar or lenigallol in varying proportions to a paste or cream, for example :—

R	Ichthyol	-	-	-	-	-	℥ v
	or						
	Liq. pic. carb.	-	-	-	-	-	℥ xl
	Starch	-	-	-	-	-	
	Zinc oxide	-	-	-	-	aa	ʒ iss
	Soft paraffin	-	-	-	-	to	ʒ i
	or						
R	Ichthyol	-	-	-	-	-	℥ ij-v
	Zinc cream, B.P.C.	-	-	-	-	to	ʒ i

To such patches X-rays applied in fractional doses are often of the greatest value.

#### LOCAL TREATMENT OF SPECIAL VARIETIES

*Infantile eczema.*—The crude tar paste advised by C. J. White has proved of the greatest value in infantile eczema. Its formula is as follows :—

R	Crude coal tar	-	-	-	-	-	2 parts
	Zinc oxide	-	-	-	-	-	2 parts
	Starch	-	-	-	-	-	16 parts
	Paraffin	-	-	-	-	-	16 parts

The tar and zinc oxide must be thoroughly mixed and then incorporated with the starch and soft paraffin, also intimately mixed. The resultant preparation should be almost black. The paste should be applied to the affected parts twice daily, or in very restless cases once in 24 hours; it must be gently removed with olive oil before re-application. The only objection to this preparation is that, like all crude tar preparations, it sometimes gives rise to follicular pustulation.

To overcome this difficulty a distillation product of tar, obtained by passing steam through tar and extracting the distillate with ether, has been used; after the ether has been allowed to evaporate, a viscid semi-solid preparation is left. This has proved

a satisfactory substitute for crude tar and its use is never followed by pustulation.

Whatever preparation be used for the local treatment of infantile eczema it is essential that the child should be kept completely at rest; the arms and, if necessary, the legs should be splinted; under these conditions the eczema generally improves with surprising rapidity.

*Chronic eczema of the scalp in children.*—This variety of eczema is almost always of infective origin, and is generally associated with post-auricular fissures and eczema, and chronic blepharitis. The local treatment is difficult. In the presence of weeping and crusting it is best to begin by cutting the hair and applying purely soothing lotions, such as lead lotion, until the acute phase has passed. In the succeeding dry desquamative phase one of the tar preparations that have been mentioned in connection with infantile eczema may be used. Small doses of X-rays are of great value in the treatment of this variety of eczema, but a full erythema dose may aggravate the eczema and may be followed by cicatricial alopecia.

Post-auricular fissures may be painted with 1 per cent. solution of nitrate of silver in spirits of nitrous ether or 1 per cent. protargol, or with the aniline dyes malachite or brilliant green 1 per cent. in 25 per cent. spirit. If chronic otitis media be present the eczema will not, as a rule, improve until this condition has been cured by operation.

For chronic dry seborrhœic eczema of the scalp the following preparation may be found useful:—

R.	Oil of cade	-	-	-	-	-	℥ xxx
	Sulphur	-	-	-	-	-	grs. xv
	Salicylic acid	-	-	-	-	-	grs. x
	Soft paraffin	-	-	-	-	-	3ij
	Cocoa-nut oil	-	-	-	-	to	3i

The scalp should be treated with this at night and shampooed every few days.

For the dry figured variety of seborrhœic eczema of

the chest and back, sulphur is the best remedy :

R	Sulphur	-	-	-	-	-	-	grs. xxv-xlv
	Kaolin	-	-	-	-	-	-	grs. xv
	Zinc oxide	-	-	-	-	-	-	grs. x
	Benzoated lard	-	-	-	-	-	to	ʒi

For the more acute varieties of seborrhœic eczema and for cases in which weeping and impetiginous crusting are present, the principles outlined for the local treatment of eczema in general should be followed.

For lichenified eczema of the flexures, White's crude tar paste and fractional X-ray exposures are the best local treatments. In varicose eczema and chronic infective eczema of the legs the patient should be kept at rest to begin with and treated with local protective remedies until a quiescent dry desquamative phase is reached ; an Unna's paste bandage may then be applied and changed about once a week. Varicose veins should not be treated until the eczema has almost or completely disappeared.

*Intertriginous eczema of non-mycotic origin.*—The treatment of eczema of the intertriginous folds is often difficult and unsatisfactory because it may be impossible to alter conditions such as obesity and hyperidrosis, which favour its development. Watery pastes, starch powder and water lotions are found useful in the acute phase, while later zinc oxide paste or a mild tar paste may be employed. X-rays may be applied in small doses with great advantage in very chronic cases.

#### GENERAL TREATMENT

Rest, mental and physical, is of paramount importance in the treatment of eczema. Sleep should be ensured if necessary by the use of drugs. The diet may be mixed but should be simple and moderate in quantity. Stimulants are best avoided, and pepper, mustard, chutney, curries and highly spiced food of any kind should be forbidden. In the cases belonging to the eczema-asthma group, as well as in those suffering from intestinal stasis and toxæmia, a lacto-vegetarian



and carbohydrate diet is of undoubted value. In infantile eczema fats are generally badly tolerated and improvement may follow dilution as well as diminution in quantity of the milk feeds. In the rare cases of sensitivity to cow's milk the synthesized milk, Almata, has proved a valuable substitute. In cases in which an idiosyncratic sensitivity to special foods is known to be present, these and similar foods must be strictly avoided.

In weeping generalized eczema in plethoric subjects the Guelpa treatment may be given for a few days. In this the patient is given no food but allowed fluid in abundance, while sodium and magnesium sulphate are administered in sufficiently large doses to ensure copious fluid evacuations. The object of this treatment is to promote dehydration of the cedematous skin. Irrigation of the lower bowel is of value in selected cases. Heliotherapy is of great value in eczemas of microbic origin, especially in children, as well as in the eczema-asthma group; but the results of artificial light therapy have proved disappointing. Though good results have been claimed from the use of a variety of internal remedies, drugs have so far not proved a great success in the treatment of eczema. Non-specific protein therapy has also on the whole proved disappointing, although an occasional dramatic success is achieved with auto-hæmotherapy. Eczema is always aggravated by nervous instability and worry, and psychological treatment is often of the greatest importance.

# Ringworm of the Scalp

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THE modern recognition and treatment of ringworm is governed by two factors that did not complicate the clinical problem in the pre-war years. Ringworm is a diminishing disease, as is shown by the following figures of the new cases at the London Hospital :—

1927	-	-	-	196
1928	-	-	-	160
1929	-	-	-	142
1930	-	-	-	124
1931	-	-	-	99

Associated with this has been the official tendency to aggregate the treatment of ringworm into a few highly-skilled centres. This means that ringworm cases present themselves rarely before the practitioner, and hence there is happening here, as in the case of syphilis, diphtheria, and other segregated diseases, a divorce of this condition from the everyday thoughts of the practitioner.

X-ray epilation, and medicinal epilation by the internal administration of thallium acetate, are both comparatively modern and certainly are forms of treatment that involve a measure of risk. Since every ringworm case in school children happens to be under the supervision of school nurses, school doctors and public health authorities, there seems to be on the part of practitioners a reluctance to undertake a treatment which may be criticized and must be reviewed by these many interested onlookers.

The early recognition of ringworm is the chief method by which the propagation of this unpleasant malady can be checked. It is a great reproach to the hair-

dressers' calling that, although they have handled human heads day by day for centuries, it is the rarest possible event for a case of ringworm to be sent to a physician by a hairdresser. Had they been competent and authoritative in this elementary observation, school nurses would not be compelled to make an anxious search of thousands of heads after every prolonged holiday period. Experience has amply demonstrated that this affection is spread easily and rapidly by the interchange of hats and by the common use of brushes and combs. The pressure of the head against an infected barber's coat has before now infected a preparatory school in which separate brushes and instruments were used for each head.

Subjective symptoms, such as itching or discomfort of the scalp, are rarely felt. In the earliest stages ringworm appears as a small area of pseudo-baldness with a fairly definite outline, having a white or grey scaly surface from which project four or five short hairs broken off about a millimetre from the surface of the scalp. Generally the number of scalp lesions are multiple, two or three lesions being quite common if searched for. Later the disease may develop in several ways. In the thin, delicate scalp of very young children numerous red cyclic lesions may be recognized, an inch to 4 inches in diameter, having a raised, rounded surface covered by adherent greyish scales causing little or no loss of hair and responding easily to treatment with anti-parasitic ointments. In children of three years or over there may develop several nummular discs of closely-applied, small, overlapping scales, with a glistening whitish surface. These discs may vary in size from 1 to 3 cm., and the baldness of these patches may be striking and apparent. Small stumps hardly project above the surface of the scales. The underlying skin is sometimes definitely pink, is never moist, and sometimes shows no colour change. Often the affected area is broad, showing a sheet of dirty,

greyish scaling in which are many stumps and profuse long hairs, which mask the condition to some extent.

At any examination of a suspected case of ringworm it is highly advisable that every young member of the same family should have his head thoroughly inspected. Moreover, it is common for most helpful material to be furnished by an examination of the patient's neck and trunk. Secondary satellite circular discs of growths of ringworm on these areas are as confirmatory of the diagnosis of a suspected patch of pseudo-alopecia of the scalp as is the production of a growth of mould in a culture tube. The physician's work is made difficult if the scalp has been stained by the application of ink or of iodine or of patent ointments; whilst diagnosis is greatly facilitated if the hair be clipped all over uniformly close to the scalp. At times both boarding-schools and orphanages will need the close attention of a practitioner. Cases may suddenly crop up in epidemic numbers owing to the inadvertent admission of an infected head. The children may be too crowded. Their clothing not in use may be too closely packed together, with the risk of infection by scales spreading from the neck of one overcoat to another. Brushes and combs may not have exclusive ownership; weekly cleaning of these may be overlooked. The washing of the children's heads may be irregular and infrequent. The same towels may be used for two or more heads in succession. It is important that new admissions and children returning from holidays should arrive with their hair short, otherwise an infection of the scalp may remain hidden and become disseminated for some time without the knowledge of the authorities. If the reason for this is given, I feel sure that most parents would gladly co-operate. The risk of an epidemic of ringworm is too great to be balanced against an individual mother's preference for a long-haired boy or a long-haired girl. An outbreak of ringworm on the girls' side is always most deplorable. As

a measure of prevention I have no desire to lay any stress upon sterilization of blankets or mattresses; they are sufficiently protected by sheets, which are boiled. Exposed woollen clothing can be sufficiently sterilized by rubbing the necks of overcoats with a rag soaked in methyiated spirit and afterwards baking. The procedure of burning the hair brushes of infected children is right.

The school barber will need a word of advice.<sup>1</sup> He should wear a different overall for each separate batch of children, which should be boiled after use. He should have two pairs of clippers, and when one is being used, the other should be kept in a bowl of white surgical spirit. Lysol solutions are ineffective once the instrument is made greasy by its contact with the scalp. In the same way there should be for so many heads at least three pairs of scissors and three combs in use. These, too, should lie in a bowl of spirit; never in the pocket of his overall, which becomes after a short space of time a pocket of infection. The room in which the hair is cut should have a supply of soap and water so that he can easily wash after touching any suspicious scalp. It is important for prevention that a separate towel should be used for the neck of each child while the hair is being cut. The last item is that the use of a soft common brush for removing hairs from the neck should be omitted.

X-ray epilation still maintains its position as the primary therapy. X-rays do not kill ringworm spores, but they produce epilation in twenty-one days, and complete epilation is the essential for successful treatment. Ill-effects have been recorded from the earliest days. Eczema, dystrophy, and cancer of the operator's fingers are now guarded against. Penetrating ulcers of the assistant's hands used to hold the child's head in position and wrist-drop have been carefully noted and recorded. Large areas of permanent alopecia of the scalp are still produced by errors of technique, or

perhaps by some inexplicable and rare susceptibility, in small treatment centres. In the London Hospital skin department between September 1, 1905, and December 31, 1931, 8,335 cases of ringworm of the scalp have been treated without—so far as we know—any permanent ill-effects. This is due to the great care taken by J. H. Sequeira,<sup>2</sup> my predecessor, in establishing and formulating a sound technique, and to the care the operators have since taken never to depart from the lines laid down by him. The epilation dose is four-fifths of a Sabouraud pastille. Gas-tubes have always been used and are in use now. Children are not treated below the age of 4. Artificial restraint is never necessary, but once a year a refractory child needs a small dose of chloral. S. C. Shanks's<sup>3</sup> report of 2,400 cases treated by X-rays is equally satisfactory.

As anyone who wishes to undertake this work must study in a clinic where the work is traditional and well-established, no purpose would be served by any full account of the details observed; but, at the London Hospital, as at all teaching hospitals, special students are welcome visitors.

No account of treatment would be complete without a full reference to epilation by thallium acetate. It was rejected by Sabouraud as dangerous in the early part of this century. In England we owe its introduction to G. B. Dowling,<sup>4</sup> in 1927, and he has been ably supported both by J. E. M. Wigley and by J. T. Ingram,<sup>5</sup> whose procedure I know to be perfectly safe and simple. His practice is to weigh the child naked. The weight in pounds is multiplied by four, which gives the required dose of thallium acetate in milligrams. This method appears to me simpler and safer than the usual practice of weighing in kilograms and varying the dose *per kilogram* as between eight and nine milligrams of thallium acetate dissolved in a draught of sweetened water.

If the dose be under 200 mg., the administration is

followed by ordinary out-patient supervision. If the dose is between 200 and 250 mg., the very cautious will treat the case in bed, but it is satisfactory to proceed without anxiety, as long as the child is kept under observation. Between 250 and 300 mg. great watchfulness must be exercised, and the case be treated in bed. A larger dose than 300 mg. should never be given. The average age of a child requiring 200 mg. is 7 years; 250 mg., 9 years; 300 mg., 12 years. It will be seen that there is little danger in treating children up to the age of 9 years. Epilation and regrowth occur in three weeks.

When such precautions are taken it is impossible for a child to receive anything dangerous in the way of an overdose, even although slight errors are made in the calculations or the scales prove inaccurate. Ingram stresses, and I agree, that it is unwise to use stock solutions of the drug, since this practice may lead to errors in dispensing. Tablets of varying strength may be obtained in different colours, so that there is little or no excuse for dispensing errors with this dangerous drug. "In most cases the tablets are swallowed by the child, who is subsequently given a drink of water. There is less chance of the child not receiving the full dose if this practice is followed." There is, however, considerable room for further improvement in the wholesale dispensing. Should epilation be unsuccessful, he does not consider it wise to repeat a dose of thallium by the mouth without an interval of not less than three months. In using thallium acetate the scalp should be washed night and morning with soap and water, and apply a very thin film of ung. hyd. ammon. dil. daily to the cropped head to prevent the dissemination of any scales. Ingram paints the whole scalp three times a day with 2 per cent. tincture of iodine every day from the onset of treatment. If iodine is used no ointments nor fomentations should be applied as well, as painful suppurative dermatitis medicamentosa would easily

develop.

No evidence has been yet recorded that suggests that treatment by thallium will do permanent damage to any organ. This idea may be dismissed. Deaths from thallium poisoning have occurred, from mathematical miscalculations, from inaccurate scales or from continued partial dosage day by day. There is no conclusive evidence that danger is to be expected apart from avoidable errors in technique of this nature. In thallium acetate we have a measure of safe therapy that brings the treatment of small-spore ringworm within the powers of every medical practitioner. It is the rule for perfect recovery to be made in a case of ordinary ringworm of the scalp. Reinfection by old toilet articles, or by an untreated case in the family, is always possible, but such cases are rare.

A special clinical type of ringworm of the scalp traditionally called *kerion Celsi* is produced by a virulent infection of the hair which provokes a very strong local and sometimes general reaction. Such cases present a domed red swelling, on which the hairs are not broken off, but can be withdrawn with the greatest ease from the follicles in the boggy, inflamed zone.

Not infrequently these well-defined and sometimes painful domes of reaction are incised by junior surgeons, but there is an exudation of clear and sanguineous fluid without the demonstration of any pus. It is common in this last condition for the hair roots to be destroyed by the intensity of the inflammation and for a permanent small scar to remain at the site of the disease.

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# Seborrhœa

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SEBORRHŒA is a cutaneous condition characterized by faulty secretion of sebum and sweat, and occurs at certain periods of life, often unfortunately persisting in the intervals, and affecting areas of the body rich in sebaceous and sudoriparous glands—particularly the scalp, face, front and back of the trunk, especially the chest and the flexures. A good many years ago I defined the condition as the “dyspepsia of the skin,” and, as affecting the glands, it is a more suitable name for this disease than for eczema, a recent American suggestion.

The polymorphic character of the eruption, though familiar to most, may be recalled here. On the scalp it appears as dry scaling, more or less severe at times, even to the extent of forming sheaths of scales up the hairs. When more acutely inflamed, generalized swelling, well-marked redness, oozing, exudation, and the formation of crusts with sometimes loss of hair occur. There is a rarer type in which there is excess of secretion and the scalp is primarily very moist and greasy. The auricles show scaling and redness, usually first near the external auditory meatus or at the retro-auricular fold. Generalized swelling, oozing and crusting may supervene later. The face is mostly attacked in the hairy regions near the orifices or at the fringe of the scalp. On the front and back of the chest generally it appears as irregular areas, slightly red or yellow, with more or less scaling at the edges or over the surface of the affected area.

Other forms are seen, the most common being the papular, and the less common, diffuse erythema with slight scaling. On the flexures where more sweat glands normally occur and redness with a certain

amount of scaling is the first manifestation, there is generally a greater amount of moisture and subsequent swelling, and of crusting in the more severe types. In this category come the napkin rash, seen on the buttocks and groins in infants, and the firing under the pendulous folds of the stout, full-breasted woman.

The constitution of sebum and sweat has been frequently a subject of research. Pachur<sup>1</sup> states that the sebum consists of 88·6 per cent. neutral fat, 7·54 per cent. cholesterin, and 4·2 per cent. of cholesterol-esters, soaps and phosphates. Sweat also is said to contain cholesterol with alkaline salts. Confirming clinical experience, Pachur finds an increase of sebum at puberty and decrease in old age. He also notes an increase when the subject suffers from seborrhœa, acne or folliculitis. It has long been recognized that the consistency and the amount of both secretions vary in disease.

Whatever the full biochemical changes, it is evident that they render the secretions more suitable culture media for numerous organisms. It is not surprising therefore that the disease has been attributed to the organisms found in these lesions. McLeod and Dowling<sup>2</sup> have recently done excellent work in proving the presence of monilia in the scaly type; Sabouraud<sup>3</sup> insisted on streptococci as a factor in the inter-triginous type, and other observers have found different organisms. All credit should accrue to these workers, and no doubt need be felt as to the truth of their observations so far as they go, but I am convinced that it is only one aspect of the truth, and even some of them agree that there is a constitutional change also responsible.

Well-marked cases show the seborrhœic type of individual, generally debilitated and suffering from periodic eruptions on the scalp, eyebrows, eyelashes, beard region and flexures, a condition that no mere local infection would account for. Reasoning from

this, it is always advisable to consider even in mild cases that there is an underlying diathesis. Some general disease or metabolic error may lower the individual and increase the skin sensitivity. Still more frequently a local infection or irritation is the cause of an outbreak which spreads far beyond the original site. Some will recall cases of boils, trade dermatitis, and the local irritation of an embrocation followed by such a sequel.

The following possible factors may first be discussed : civilization, diet, acidosis, and endocrine disturbances. *Civilization*, with the compulsory use of clothing, with the growth of cities and the resultant smoke and dirt, has often been regarded as the cause of the outbreak and spread in the susceptible individual. Irritating soaps are used to remove the dirt and dust. Take the experience of the baby in a working-class home, where all may live in a common room and the crib is frequently placed beside the often-stoked kitchen fire. Is it to be wondered at that, with the changes of temperature, dirt and dust, a seborrhoeic dermatitis is apt to appear on the face and scalp ? The active little head and hands soon disturb the sheets and come in contact with the flannel of the blankets ; the contact is followed by severe itching and rubbing, and the sequel is the all too common type involving the face, scalp, neck and hands. The flannel rash of the young adult is well known and occurs especially after perspiring and the wearing of new, unwashed flannels.

*Diet* may also come under the heading of civilization, and it has been a subject of much separate research. Some workers have laid stress on the evils of too much carbohydrates in the diet, and others on too much fat. American writers aver that valuable information can be obtained by examination of the stools of the affected infants. In my personal experience no great benefit has been obtained by such examination. Clinically, however, it should be noted that the moist exudative

types are certainly often improved by the reduction of the carbohydrates, and of these sugars and sweets are undoubtedly the worst. In the infant it often comes on after an early weaning, say, of three months. This must not, however, be confused with the type so frequently arising on the face and cheeks in the first few weeks after birth. I have certainly traced it after weaning to some of the proprietary foods rich in sugars. Here is a case for thought. A baby had an intussusception necessitating an operation and removal of some feet of the bowel; thereafter diarrhœa followed, and the eruption spread from the nates all over the body. What metabolic changes occurred to produce this? On the other hand, it is very significant that many cases discharged from hospital apparently cured, relapse soon after, even though the diet has not been altered. Further, cases have been admitted into hospital in which no fault could be attributed to the diet, and these have cleared up in hospital and then relapsed after discharge. In some of these the histories no doubt may not have been accurate and such errors as feeding between meals indulged in, but this is based on the experience of hundreds of patients with intelligent parents only too anxious to keep the children well.

The question of *acidosis* was brought to the front some years ago, and cases recorded in which large doses of alkalis were followed by improvement. Ingram reports 26 cases of seborrhœa, and in these no evidences of acidosis could be found. I have treated a large number of cases on these lines, and even in the case of in-patients have pushed the alkali until the urine was strongly alkaline without the slightest benefit either to the patient or the seborrhœic manifestations. Nevertheless, in quite a number of old people, even without glycosuria, a full administration of alkalis allayed the itching and improved the local condition. Theoretically with a heightened  $p^H$  value

of the serum an alteration in the secretion of the sebum and sweat would be expected.

*Endocrine disturbances.*—It is well recognized that seborrhoea, while occurring at all periods of life, is apt to break out when there are evolutionary and devolutionary changes in the glands of the skin. The vernix caseosa of birth is not pathological, is purely protective, but is sometimes excessive. Infantile dermatitis may be seen, even within the first week, originating on the cheeks or the scalp, or may appear some months later. At puberty seborrhoea of the body and scalp, acne and rosacea may serve as examples. At the menopause rosacea and infections of the flexures are very common, while in old age we have the dry skin following the imperfect oiling and moisture and the resultant susceptibility to irritants. Exfoliative dermatitis is a frequent sequel. The following may serve to illustrate the above.

A lady near the menopause went to the hairdresser for a shampoo, and thereafter developed a seborrhoeic dermatitis spreading from the scalp and ultimately involving all the flexures. It seems quite certain that the skin at that period was unduly sensitive, and that a seborrhoeic dermatitis having commenced in one area readily spread to other areas commonly affected in seborrhoea. It must, however, be remembered that endocrine disturbances may also be the direct result of gastro-intestinal poisoning.

That the pituitary, thyroid, and adrenals, and possibly some other glands, have an influence on the skin is scientifically established. Empirically the administration of thyroid is often of value, and infants occasionally show a curious combination of a mild xeroderma with seborrhoea. The pituitary has a controlling influence on the gonads, and as in these latter glands disturbances are more common at the crucial periods of life, then the pituitary may be a controlling factor there also, but this problem cannot

be elaborated until the individual activities and the inter-relations of these and other glands are more scientifically explained.

In extensive cases, however, in which relapses occur and involve the scalp and the flexures there would appear to be some other factor; for instance, a young woman, whom I have treated since she was two or three years of age, still has relapses of the disease, and is incapacitated for any outside work. It cannot be explained on dietetic grounds, from the point of view of environment, or even as a monilia infection, but it may be compatible with disturbance of a hormone in the skin.

The diagnosis of these conditions in the chronic stage is easy. In the early stage affecting the trunk, ringworm and even syphilis may have to be eliminated. Affecting the flexures, other fungoid infections may also have to be considered. The later developments of seborrhœa may be either recurrences of moist eruptions on the flexures or papular eruptions on the limbs or trunk with periodically fibrosis and lichenification in certain areas that have been itchy and scratched.

#### TREATMENT

Before discussing treatment it is as well to revert to the statement that seborrhœa underlies many other skin conditions. Epidermophytosis has been mentioned, and I am quite sure that the seborrhœic skin is one which is very liable to infection by fungi. Where a typical clinical picture of dhobi's itch is seen in the groins, a history will often be obtained of a seborrhœa having occurred before, or it may occur later; indeed, all the flexures may be involved. On occasions one has seen seborrhœic dermatitis of the body in which the lower limbs became infected by epidermophytosis spreading upwards from the toes, and this last responded readily to Whitfield's salicylic and benzoic

ointment. Such a simple condition as impetigo of the face will at times be difficult to treat in a child owing to the underlying seborrhoea, and in the adult it may develop into a well-marked sycosis. Many other illustrations might be given, but these must suffice.

With such a picture in view, it is small wonder that the general practitioner abhors dermatology, but there is a bright side. The seborrhoeic dermatitis of infancy, trying to the doctor, and still more so to the parents or nurse on account of the restless nights and the continual dressings, yields in the vast majority of cases, and that even when hope is almost expiring. A child whom I treated ten years ago for involvement of the whole body was seen recently with a skin which has remained normal for the last nine years. Similarly, the manifestations at puberty in the form of seborrhoea corporis or acne are generally amenable to treatment, if it is thoroughly carried out.

It can be gathered from what has been said that each case must be individualized, and also that it is almost impossible to describe all the varieties. The treatment must be general as well as local. Though various internal methods have been suggested, it is desirable to insist that amidst all the welter of theories, the fact stands out that a healthy gastro-intestinal tract and attention to the teeth and general health are of paramount importance. Quite recently an obstinate seborrhoeic sycosis, which had been X-rayed and treated in all sorts of ways by other dermatologists, yielded at once to gastro-intestinal treatment and has remained cured. Septic teeth and pyorrhoea may not cause any apparent indigestion, but, as I have remarked elsewhere, a digestion that is capable of absorbing pus without suffering itself, may allow the circulation of the poisons arising therefrom more readily than a more sensitive stomach which resents the presence of pus. It should therefore be a constant

rule to overhaul the teeth.

In chronic cases the use of peptone intramuscularly or intravenously is of great value. In acute cases, staphylococcal vaccines are useful. Space will not allow details, but their employment should not be overlooked.

*General treatment.*—In extensive cases baths are necessary, soothing if acute by means of weak permanganate of potash, bran or starch, more stimulating by weak alkalies, potash carb. or sulphur in the chronic cases. As ointments are expensive, it is advisable to use lotions if possible. Generally speaking, sulphur in lotion, ointment or paste takes precedence. Thus, in extensive cases I very often prescribe lead and zinc, or ichthyol- or sulpho-calamine lotion, according to the character of the lesions, using the first when very moist, the second when only erythematous, and the third in more long-standing cases. The lotions, however, are drying, and it is a good plan to prescribe along with them a paste for application over the worst areas. The pastes, made up in bases of equal parts of zinc oxide, starch, lanoline and vaseline may have added to them 1 per cent. of ammoniated mercury if the condition is very infected, 1 or 2 per cent. of ichthyol if it is simply erythematous and very moist,  $\frac{1}{2}$  to 2 per cent. of sulphur with, if necessary,  $\frac{1}{2}$  to 2 per cent. of salicylic in the thickened, scaly type. At a later stage 1 or 2 per cent. of crude tar in paste is generally our most active anti-pruritic, and resolvent of fibrosis.

In the flexures and behind the ears, when there is much moisture, a 1 per cent. of silver nitrate solution applied daily is one of the best astringents. Where colour is not objectionable, again in the moist areas,  $\frac{1}{4}$  to  $\frac{1}{2}$  per cent. crystal violet or gentian violet in spirit will be found to exercise a good astringent as well as antiseptic effect.

Where the scalp is involved, the routine plan is to



use an ointment containing 1 or 2 per cent. sulphur and salicylic acid in mild cases, but, if infected, it is well to leave out the salicylic and use 1 per cent. of ammoniated mercury along with the sulphur, even although it leaves a rather dark deposit of sulphide of mercury. Later these may be substituted by a spirit lotion containing  $2\frac{1}{2}$  per cent. of salicylic acid and oleum ricini, which the patient may use for long periods. For very severe cases it may be necessary to have the hair cut, and even shaved, but in women this course will naturally be avoided if at all possible. Ultra-violet radiation, by means of the mercury vapour or carbon lamp, is of value in debilitated cases, if given with care generally as a tonic, but in acutely inflamed cases it is harmful and apt to set up exfoliative dermatitis.

If X-rays are available much benefit is often derived by giving a third of a pastille dose on three occasions at weekly intervals to each affected area whether it is in the acute or improving stage.

This article aims only at giving general principles, but no affection requires more attention to minute details of treatment. The future is rich with promise, and it is on the developments of endocrinology and biochemistry that our hopes rest.

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# Diet as a Factor in the Etiology of Acne Vulgaris

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THERE is frequent reference in the literature of acne vulgaris to derangements of the digestive system and the mal-assimilation of food as being in causal relationship to the onset of papules and pustules. There appears to be very slight suggestion that foods may be causes in themselves, in persons who have developed a sensitivity to those articles of diet. Duncan Bulkley<sup>1</sup> mentions bananas and nuts as being known to act unfavourably upon acne, while it is a common belief in the West Indies that bananas produce acne in children whose main diet is composed of this fruit. Cheese and eggs have also been alluded to as possible causes, but I have seen no reference to pig-fat as an etiological factor. I believe that this is a commoner phenomenon than is generally supposed and is certainly of very great importance in this most trying and relapsing disease.

It is well known among sailors that salt pork diet at sea is liable to produce boils, and as often as not these so-called boils are pustular acne. This has been attributed to the preservatives of the pork, but I believe that the cause is pig-fat. Two patients came very closely together, and first brought my attention to this question.

The first case was a trooper who had just landed from a troopship from South Africa, and presented very severe acne pustulata on his back. This had ensued directly upon drinking the fatty water pork had been boiled in, for a wager. Having started the acne, treatment seemed powerless to relieve it, until pig-fat was stopped.

The second case was that of a lady who for ten years had suffered terribly from pustular acne, which had resisted all manner of treatment from many specialists. In course of conversation she told me that ten years previously she had been in a "decline" and had been urged to take all the fatty food she could manage.

Rather proudly she said that she had never missed bacon for breakfast since. Remembering the former patient, I stopped all pig-fat and for the first time she began to improve and ceased to develop new lesions. She eventually made a complete recovery.

Since then I have been on the lookout for similar cases of persons sensitive to pig-fat, and have been rewarded more abundantly than I anticipated.

One of these cases happened to occur in a member of my own family, so that it was easy to test it thoroughly. This lad was very sensitive to pig-fat of any kind, whether as bacon, sausage, lard, or in any other form. After the removal of pig-fat from his dietary, he remained free from lesions, but the smallest trace of pig at any time produced spots at once. On one occasion after being free from spots for months, he had a breakfast meal with bacon and after 24 hours he had the worst crop of acne pustules that he had ever had. Treatment was powerless to prevent the evolution of fresh lesions until 14 days had passed, when the process ceased and no new spots developed. On one occasion he developed pustules and papules after fried eggs, and I thought that he might have developed a sensitivity to eggs, but I found that these eggs had been cooked in bacon fat, and that he could take eggs cooked in any other fat with impunity.

This observation is of peculiar interest for three reasons. First, because of the length of time the single meal was capable of producing lesions—namely, fourteen days. Secondly, the fact that no treatment which I used during this fortnight prevented in any way the lesions from evolving, or even in mitigating the severity of the outbreak. Thirdly, the small amount of the offending pig-fat which proved sufficient to produce spots, namely, just that amount which adhered to the eggs after frying in bacon fat.

With this experience I have set my patients with acne, especially pustular forms, and those whose spots come out in crops with intervals of freedom, to keep diet charts, and I have found as many as 25 per cent. of my cases who have shown some relation to pig-fat as either the exciting cause or as a contributing factor. There were among them, of course, many cases which showed no relationship to pig-fat in any form, but there are many cases where I have had no reports, and it is therefore possible that the 25 per cent. may be too small a proportion. I have met, however, with cases where other foods were or seemed to be the cause of the lesions.

In one case, that of a girl aged 14, I believe the acne was largely determined by large ingestion of chocolate, for she admitted that a day was ill spent if she did not eat half-a-pound of chocolates. This

large excess of sugar may readily produce the accompanying seborrhoea, and would certainly be liable to make an existing acne worse.

If food of any kind is a contributory cause of acne, only stopping this article of diet will relieve the patient, unless the follicles are completely dried up by means of X-rays. No lotions, pills, vaccines, or kindred treatments can be expected to arrest the process. But if the offending article of diet is determined, the omission of this will be all that is necessary in the majority of cases. In some it may be found that a few spots continue to evolve, but then treatment will be found to have an effect which it did not produce before. This is distinctly not a question of indigestion. These persons can take pig-fat and enjoy it without the slightest sign that it does not suit them. It is undoubtedly the excretion of a fat through the skin, which is capable of irritating the follicular wall directly, or what is more probable, of giving the organisms in the follicles a food from which they make irritant toxins. It is quite possible that these fats are of a different melting point from the ordinary sebaceous oil, that they remain as fatty plugs in the follicles, and as they are not extruded, the products of germ growth do not escape and so act upon the walls of the follicles.<sup>2</sup>

I therefore suggest that:—(1) There are not infrequent cases of acne vulgaris and pustulata, which are dependent upon dietary factors for their onset. (2) Only the stopping of the offending foodstuff will result in the cure of the patient, or at least in permitting treatment to be effective. (3) Very small quantities of the offending diet are sufficient to cause eruptions in very sensitive cases. (4) The eruption of lesions may continue for a week or longer from one meal of the deleterious substance. This fact probably explains why the connection between diet and acne has not been observed more frequently.

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# Impetigo

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**I**MPETIGO contagiosa is an acute inflammation of the skin in which there is the formation of flat vesicles which become pustular. It is met with at all ages and in all social grades, but especially in the less favoured classes. This is particularly evident in the work of school clinics where the incidence of the disease is much greater in schools attended by children from the poorer quarters of the city. Defective domestic hygiene and neglect are factors directly affecting its development and upon their control the prophylaxis of the disease very largely depends. The Children's Act of 1908 imposes parental liability for neglect inducing impairment of juvenile health. Its powers, however, might with advantage be extended so as to authorize the medical examination of parents or guardians where it was suspected that one or other had transmitted disease to the child and maintained the risk of further attacks.

Impetigo contagiosa is eminently amenable to treatment and should be much less prevalent. The figures in the last Annual Report of the Education<sup>n</sup> Health Service, Corporation of Glasgow, show 48 per cent. of cases, i.e. little short of half, in a total of 16,335 skin diseases treated at the clinics. Its diminution depends mainly on the active co-operation of parents and guardians, and this is often difficult to secure. George Augustus Sala said that a man who only once in seven days took a bath could not be called a cleanly person. If the community generally would even practise this infrequent complete ablution the incidence of impetigo

contagiosa would fall very appreciably. While want of domestic hygiene plays an extremely important contributory rôle in the maintenance of the disease, it is not its immediate cause. In the micro-organismal flora constantly present on the skin streptococci and staphylococci are found, their numbers varying according to the degree of personal cleanliness. Sabouraud has demonstrated that by taking the exudation early from the vesicles a pure culture of the streptococcus may be obtained by growing it on fluid media in a capillary pipette. Staphylococci are also found in the lesions, but the primary cause is doubtless a streptococcus. It has, however, been claimed that lesions resembling impetigo contagiosa may be produced by staphylococci. Any breach of the epidermis is liable to coccal invasion, when the virulence of the organisms and the degree of resistance of the individual will determine whether or not the disease will appear. A very frequent predecessor and accompaniment of impetigo contagiosa is pediculosis capitis. The associated itching of this latter excites scratching with consequent breaches in the epidermis through which cocci enter.

In an analysis of 5,655 cases of skin diseases seen at the Western Infirmary, Glasgow, 1,115 were impetigo contagiosa, i.e. 19·7 per cent. The disparity between this percentage and that of the Education Health Service is owing to the latter's statistics being only of children between the ages of 5 and 14 years. The incidence of pediculosis capitis in these 1,115 cases of impetigo is 62·8 per cent., of which males show an incidence of 52 per cent. and females of 73·2 per cent. In an analysis "Age Groups and Incidence" compiled by my resident assistant, Mr. J. G. Thomson, it will be seen that 78·5 per cent. of the cases of impetigo contagiosa occurred in the first three quinquennia, due doubtless to maternal neglect and the greater risks of contact during school

years. After the third quinquennium there is a strikingly rapid fall, due to an awakening of self-

IMPETIGO CONTAGIOSA IN RELATION TO  
PEDICULOSIS CAPITIS

(Western Infirmary, Glasgow.)

—	Impetigo (No. Ped. Cap.).	Impetigo (c. Ped. Cap.).	Total.
Male Cases - -	260	282	542
Female Cases - -	153	420	573
	—	—	1,115

AGE GROUPS AND INCIDENCE

(Western Infirmary, Glasgow.)

Quinquennia.

No. of Cases. Males.	1-5	5-10	10-15	15-20	20-25	25-30	30-35
	152	134	129	44	25	17	6
	Quinquennia.						
	35-40	40-45	45-50	50-55	55-60	60-65	65-70
	5	4	1	1	1	0	0

Quinquennia.

No. of Cases. Females.	1-5	5-10	10-15	15-20	20-25	25-30	30-35
	173	133	148	57	22	11	17
	Quinquennia.						
	35-40	40-45	45-50	50-55	55-60	60-65	65-70
	11	5	3	4	1	2	1

respect or an increased resistance of the skin.

Most authors allude to impetigo contagiosa as a

complication of pediculosis capitis and such is indubitably the case, but this does not conform with the description by Tilbury Fox, who first described the disease, and differentiated it from eczema, in 1862.<sup>1</sup> He stated in the 1873 edition of his textbook, "usually no pediculi and no offensive smell are present." He also states: "It is ushered in occasionally by smart, generally by slight fever. There is clearly an affection of the system at large before the occurrence of any eruption. In the summer of 1870 I had a large number of cases under my care at the hospital and in many instances there was smart pyrexia accompanying the development of the disease." I do not systematically take the temperature in impetigo contagiosa—time precludes it; and it is the exception to transfer an impetigo patient from the outdoor department to the wards; but in confluent cases pyrexia may occur. I recall that of an Argyll and Sutherland Highlander some twenty years ago whose temperature, when in hospital, rose to 102.5° F.

Impetigo contagiosa may cloak other skin affections, especially where itching is a feature, such as scabies. It may complicate and temporarily obscure tinea tonsurans. I never like to see it in the bearded region, fearful lest a staphylococcal infection of the hair follicles should occur and sycosis supervene.

In an analysis of hospital cases extending over three years there did not appear to be any marked seasonal variation. Impetigo contagiosa occurs also in the more favoured classes. The public school boy is not exempt from "scrumpox." It would appear that some schools of this class are more liable to it than others. Certainly the bathing facilities in some might with advantage be increased. Its incidence, certainly infrequent, in the cleanly and well-to-do is, however, not surprising when it is considered that some strains of streptococci separated from their



human host, but in favourable circumstances of moisture and temperature, may retain their vitality for even as long as three months. This suggests innumerable channels of contagion. The herding together of all and sundry in cinema, train, tram and 'bus, and the promiscuous methods of some barbers are contributory causes in the dissemination of the disease.

Pediculosis capitis has been seen in church long since it was detected there by Scotland's national bard, and inspired the poem in which there occurs the oft-quoted couplet :

" Oh would some Pow'r the giftie gie us,  
To see oursel's as ithers see us "

This affection may be introduced into the household by domestic servants. I recall an instance which was probably responsible for a suppurative adenitis of an infant member of the family.

The lesions of impetigo contagiosa are superficial and characterized by rapid evolution. The roof of the vesicle is formed of the horny layer which has become raised by a serous exudate containing the causative cocci and accompanied by some degree of leucocytic infiltration of the dermis. The lesions begin as small erythematous macules, quickly developing into flat vesicles which soon become purulent and dry to honey-coloured yellowish crusts—not infrequently yellowish brown or greenish. They are but slightly adherent, having the "stuck on" appearance to which Tilbury Fox alludes. If they be detached at an early stage, the red base is seen to be moist and oozing, at a later stage it is dry. The lesions are discrete, or in groups of varying size. There may, however, be confluent cases where a large part or practically the whole of the face may be involved. I recall one secondary case where virtually the whole of the inner surfaces of the thighs presented two enormous plaques of crusts. The primary condition was scabies,

but it was the thigh lesions to which the patient drew attention. The itching mentioned by some authors appears to me to depend rather upon the presence of pediculosis or other primary itching affection upon which impetigo has been imposed. This may be specially evident in the suboccipital region when pediculosis capitis is present.

No part of the skin is immune, but the face is most frequently affected, especially about the mouth. Doubtless the contagion, in some instances, is conveyed by the common use of drinking vessels or their want of cleansing. Even the commendable virtue of generosity in a kindly but defectively brought-up child who offers a bite of its "piece" or apple to a companion may operate similarly. Auto-inoculation by the fingers, clothing or towel is obvious. The superficial whitlow sometimes seen may here be mentioned. Enlargement of neighbouring glands in impetigo is of frequent occurrence and may end in suppuration. In scalp lesions there may be accompanying staphylococcal invasion of the hair follicles with possible consequent permanent baldness of the area affected.

The typical features of impetigo contagiosa may undergo topographical modification. This occurs in the flexures and post-auricular regions where a red oozing surface is seen, the margin of which may show lesions presenting the usual features of the disease.

A variety not often seen, at least in my practice, is *impetigo circinata*, where the central portion of large lesions dry to thin crusts with a consequent accentuation of the periphery. It might be mistaken for *tinea circinata*.

The vesicles of impetigo contagiosa may develop into bullæ of varying sizes giving rise to the variety *impetigo bullosa*. This variety may occur in infants, and doubtless the majority, if not all, of the cases at one time diagnosed as pemphigus neonatorum were

really of this nature. The infection in most cases is probably via the umbilical stump. It may have a fatal termination, and is sometimes traceable to the common variety in midwives and nurses. It has to be distinguished from the bullous congenital syphilide; the absence of concomitant signs of specific disease or a negative Wassermann reaction will differentiate it from the latter condition.

Sometimes with the ordinary type of impetigo and at other times quite independently of any phlyctenular manifestations whatsoever there occur dry furfuraceous patches with or without a varying degree of erythema. These lesions are probably of coccal origin and frequently dependent upon a chronic otorrhœa or nasal discharge or associated, as first stated, with impetiginous lesions of the common variety. Impetigo of the labial commissures may occur as crusted cracks or as merely fine scaliness with or without a varying degree of redness.

*Ecthyma*, separately described by some authors, is a more deeply operating streptococcal infection favoured by conditions of lowered general health and diminished local resistance of the skin. Ulcers result with adherent dark crusts and definite red areolæ. The buttocks and thighs are especially affected. MacCormac<sup>2</sup> draws attention to the not infrequently occurring papillomatous growths resembling verrucose tuberculosis following upon primary or secondary ecthyma occurring in the troops in France where the *Streptococcus faecalis* appeared to be the causative organism.

*Impetigo of Bockhart* is a pustular affection of the pilo-sebaceous follicles due to the *Staphylococcus aureus* and may complicate the phlyctenular type, itching eruptions and the application of irritants.

Two affections in which streptococci play a contributory if not the sole etiologic rôle must be briefly mentioned. (a) *Dermatitis gangrenosa infantum* in which the *Bacillus pyocyaneus* has been frequently

found. The lesions become gangrenous and mainly affect the lower part of the body and thighs, but may be widely disseminated. It occurs in young and weakly infants and may follow varicella vaccination, or (b) *Dermatitis vacciniiformis infantum*. Here the *Bacillus coli* has been found. The vesicles appear on the buttocks and genital regions and rapidly become purulent and ulcerative.

Most cases of impetigo contagiosa yield readily to treatment and the method recommended by Tilbury Fox remains but little changed. He writes: "I invariably use an ointment containing five grains of the ammonio-chloride of mercury (hydr. ammoniat.) and apply it to the surface beneath the scabs which I cause to be removed by poultices and fomentations with hot water." The boric acid starch poultice is one of the best for this purpose. The ointment base may be ung. zinci, vaseline or equal parts of it and lanoline to 3i of which hydr. ammoniat. gr. v is added. Where possible, the ointment should be applied on lint and always so at night to avoid contamination of the pillow, etc., and consequent auto-inoculation. Owing to maternal neglect some cases do not satisfactorily respond. There are, however, occasionally cases, mainly of the extensive confluent variety, which are intractable to this treatment. In such I have found an aqueous lotion of ichthyol from 5 to 15 per cent., usually 10 per cent., applied on lint, of great value. It should be dabbed on to the parts, the soaked lint applied and changed night and morning with a midday moistening, with the lotion, of the exterior of the first dressing. The dressings should be moistened with tepid sterile water before removal.

Where fissures occur, as at the labial commissures and post-auricular regions, a 2 per cent. aqueous solution of silver nitrate may be used two or three times a week in conjunction with ammoniated mercury

ointment, grs. v ad ʒi. MacKenna<sup>4</sup> strongly advised for dry furfuraceous patches :—

R	Ung. hydr. nit. dil.	-	-	-	-	ʒi
	Ung. acid. salicyl.	-	-	-	-	-
	Glycerini amyli	-	-	-	aa	ʒi

In bullous cases the lesions should be punctured with a sterile needle and a dressing of boric acid ointment applied. In infants the bullæ should be similarly treated and boric acid baths cautiously given, followed by dressing with boric acid ointment to which grs. v hydr. ammoniat. might be added. In dermatitis gangrenosa infantum Adamson<sup>3</sup> recommends boric acid baths, the application of perchloride of mercury 1-2,000 and good feeding; similar treatment is indicated in dermatitis vacciniiformis infantum. In ecthyma the general health may require attention. After removal of the crusts with wet dressings the parts should be swabbed with a lotion of resorcin. gr. x ad lot. acid. borici ʒi and hydr. ammoniat. gr. v ad vaselin. ʒi applied. MacCormac<sup>2</sup> recommends a 3 per cent. and MacKenna<sup>4</sup> a 1 per cent. solution of argent. nit. in spt. aetheris nitrosi. Where pediculosis capitis is present, treatment for that condition is obviously imperatively necessary.

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# The Modern Treatment of Lupus Vulgaris

By J. BEATTY, M.A., M.D., M.R.C.P.

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THE treatment of lupus vulgaris varies with the site, number, size, and type of the patches, and even in a given case there is not yet any general agreement exactly how it should be dealt with. Considerations which lie at the base of any treatment are :—

(1) Rapidly multiplying cells are more vulnerable than normal tissue-cells. What has been gained in power of multiplication has been lost in power of defence.

(2) A nodule of lupus is composed of a group of smaller nodules. Could the tissue in which it is embedded be dissolved away, the internal surface would appear mammillated.

(3) Infective material is most abundant in the granulation tissue about the lupus areas (Buchardi<sup>1</sup>), i.e. in the outer zones of the nodules, presumably because the epithelioid cell mechanism has been able, at any rate in part, to deal with the infection in the centre.

(4) While subcutaneous nodules occur, the majority of the foci are in the corium, and there is therefore a layer of corial connective tissue between them and the subcutaneous tissue.

(5) A rapidly growing nodule is likely to break through the covering epidermis, and the lupus mass so exposed is easily infected by pyogenic organisms—mixed infection in ulcerating lupus.

(6) The patient's general health is a factor of great importance.

## GENERAL MEASURES

The essence of treatment is destruction of the

nodules. General apart from local measures have a very limited value. Cases have been known to clear up under hygienic measures, but the probability is so slight that it may be neglected. On the other hand, they are admirable, and often necessary adjuvants. The same thing may be said of injections of tuberculin (usually Koch's A.T. or T.O.T.).

Injection of gold salts have been tried recently. My experience is limited to the proprietary preparations, aurophos and solganal B, and a preparation made up according to a formula of my own, consisting of chloride of gold, sodium chloride, and glucose. The conclusions derived from a rather limited experience are : they are useless in ordinary active lupus, closed or ulcerating ; they have some value after the nodules have been dealt with in other ways ; and, lastly, isolated nodules in an old case, with much scar tissue, may disappear. If the action be not direct on the tuberculous tissue, but, as has been suggested, by increasing the development of scar tissue so that the focus is starved, the benefit in the cases mentioned receives its explanation.

#### LOCAL MEASURES

The methods in use may be divided into : (a) excision of the whole area ; (b) the application of caustics, usually chemical ; (c) some form of ray therapy.

*Excision*, when applicable, is ideal, for a scar of some sort is inevitable by any method, but it can be applied only when the lesion is small enough, and the surrounding tissues lax enough. Unfortunately, these conditions are not often present in the face where the disease is commonest.

*Caustics* : (A) *Physical*.—The actual cautery, Paquelin or electric, is non-selective in its action. If the nodule is thus burned away, a certain amount of normal tissue is also destroyed, including the whole of the corium immediately surrounding the nodule. The

result is a depressed scar somewhat disfiguring. If not done so thoroughly the disease recurs. *Diathermy* is much better. The caustic action spreads from the needle and weakens as it spreads, so that, in a successful case, the normal tissues recover while the more vulnerable diseased tissue dies; but since the infection is greatest in the peripheral zones of the nodule, it is difficult to estimate the correct amount of current and the length of application. *Carbon dioxide snow* is useful for an area of some size. It is difficult to apply to discrete nodules. Probably, the beneficial action, when the whole tissue of the area is not killed, is due to inflammatory reaction stimulating the sluggish defence mechanisms. The human body is apt to give way slowly to an invader if its advances are made slowly, and do not cause much irritation.

(B) *Chemical*.—These are, mainly, carbolic acid, pyrogallol, acid nitrate of mercury (Adamson<sup>2</sup>), trichloroacetic acid, lactic acid, antimony trichloride (Darier<sup>3</sup>), zinc sulphate (Schlammadinger<sup>4</sup>), permanganate of potash (Lancashire<sup>5</sup>). All are in use. Some have been described as selective caustics. In my opinion there are no selective caustics. I agree that a few selective agents exist, which attack certain germs, in preference to normal tissues, but these are not caustics. The caustic appears to be selective because of its greater action on the diseased tissue, but this is merely an indication of the greater vulnerability of this tissue. *Acid nitrate of mercury, trichloroacetic acid, lactic acid*, when used alone are either applied on swabs or pushed into nodules on the points of match sticks. This action is comparable to that of the actual cautery, and the same remarks apply. *Acid nitrate of mercury* applied on swabs as above, but followed by a carbolic ointment, has been used by Somerford.<sup>6</sup> *Zinc ionization* has been recommended by MacKenna<sup>7</sup> for small nodules. This is not open to the objections raised to the actual cautery or its chemical analogues.



The difficulty is, as in diathermy, in estimating the time and current to get destruction of diseased with minimal injury to normal tissue. *Pyrogallol* is an excellent caustic. It is generally used in 20-25 per cent. strength as an ointment or plaster, but can be quite well applied as a 10 per cent., or even 5 per cent., ointment if thoroughly rubbed in.

The appearances produced are the guides as to the amount of application. The area turns black and after a time pits appear in it where presumably nodules have shelled out. If the application be persevered with after this the normal tissues will be destroyed and a disfiguring and even adherent scar finally left. The area should be allowed to heal under a simple ointment when the pits have appeared, and later the treatment repeated when fresh nodules are seen. It is not to be expected that one treatment will remove all the tuberculous material. The treatment is rather painful, and requires a good deal of fortitude if carried out by the patient himself. My best results have been obtained in young people, who were treated by relatives who disregarded their tears. One case of extensive areas on limbs, body and face, was cured by this method, but the treatment lasted with intervals three or four years. The scars left were excellent, supple with no contraction.

The best way of applying *carbolic acid* is by a method introduced in Germany under the name of "pyotro-pine." I introduced a substitute for this of much the same composition.<sup>8</sup>

An approximately 30 per cent. solution of carbolic acid in 33 per cent. caustic potash, containing some precipitated chalk is rubbed over the area by a cotton-wool pencil. The epidermis is dissolved off and the nodules as the rubbing continues stand out as purple spots. The rubbing is stopped when these are well marked; if it were continued the normal tissue would be attacked and a slough would form. A dressing is then applied on lint of a paste containing salicylic acid, salicylate of soda, cane sugar, and glycerin—a hypertonic application. This relieves the pain at once, and the whole is covered in with an occlusive dressing. At the first dressing the purple nodules are often found on the dressing, and the area when cleaned up is red and pitted. The application is renewed twice a week, but the alkaline carbolic acid is used at half strength, and dabbed on, or only gently rubbed in. Eight applications are usually required on the limbs or other areas where the skin is fairly stout. On the upper chest, neck or face, as a rule fewer. The area is then allowed to heal under boric ointment. The immediate results are remarkable, the area is apparently cleared, and sometimes this is permanent, with a satisfactory scar, but as a rule scattered nodules reappear after a time. It is not advisable to repeat the treatment about the face or neck, for hypertrophic scars may be produced.

The nodules should be dealt with separately. In a number of cases complete relief has been obtained without recurrence for three years. It is difficult to apply this method where surfaces are not flat, as about the nose.

*Combined method: curetting followed by a caustic.*—

This is, in my opinion, the method of choice in most cases about the face, except (a) when a single lesion covers a small area only, (b) when the edges of the nostrils are attacked, (c) when the general health is poor and resistance therefore low. In all these cases Finsen light treatment is definitely indicated as the best, if not the only, effective method.

Curetting must be done thoroughly. First the nodule is scraped away as completely as possible with a small spoon. Next one pays special attention to the edges, curetting them all round, the aim being to produce if possible a shelving edge. A tiny overhanging piece of normal tissue is best cut away with a curved scissors. Finally, a specially small oval spoon is used for the base. The transverse width of this at its widest is about one-tenth or one-twelfth of an inch. With this the small depressions representing the bases of the nodules, which are the appearances in reverse of the mammillations mentioned in consideration(2), are dug out. The base should now appear pitted. Any nodule just inside the subcutaneous tissue will be found, for the spoon will penetrate the corium at that point; elsewhere a layer of corium will be left. One should wait after this until all oozing of blood ceases, or the caustic application will not be effective, the chemical being diluted and carried away by the blood. Then the whole area is dabbed lightly with the caustic. I prefer a 90 per cent. trichloracetic acid solution, but probably almost any caustic would be adequate. The object is to produce a paper-thick layer of necrosed tissue over the whole surface, and so deal with any bacilli which may have escaped destruction before. The application of caustics is for this only and not as a substitute for thorough curetting.

Trichloroacetic acid in particular if too freely used produces hypertrophic scars. A dry dressing is applied, and removed in three or four days, and since there is usually some moisture then boric ointment permits of healing. Sometimes the place heals under a dry scab. The scar is ultimately good, and unless the corium has been in parts completely destroyed by the disease there is no contraction.

*Ray treatment.*—Finsen light treatment by the Finsen or Finsen-Reyn lamp gives the best cosmetic results, and in addition is applicable to the nostrils where no other treatment which I have used can cause the disappearance of the disease without also producing marked deformity. It is, however, an expensive method, a method also demanding considerable skill on the part of the operator and great patience on the part of the nurse applying the compressor, and above all, it is a very slow method. The nurse must hold the compressor in which water is circulating on the affected area for three-quarters of an hour and upwards. The operator must see that the surface of the compressor is accurately perpendicular to the entering rays, and no dimming of the quartz surfaces by any impurity is permissible. The apparatus is expensive and the current used considerable. The final result must not be expected under several months.

While Finsen light treatment may be considered the best of the modern methods, if time and expense are to be considered the curetting and caustic method, and on the limbs the alkaline carbolic acid method, merit serious consideration; in both, but especially the first, final results are often rapidly attained. Three or four weeks may see epithelialization complete and, in some cases at any rate, there is no recurrence. The scars, though not so good as after Finsen light, are satisfactory and the disfigurement slight.

*Ultra-violet light*, when applied by the Kromayer lamp, can also be effective. Compression is possible

by the apparatus itself. The mode of action, results, and time necessary appear to be much the same as with the Finsen light. The apparatus, however, easily gets out of order, and less accuracy is possible in its application to small areas.

*X-rays.*—These have fallen into disuse. Numerous applications are necessary, and these are liable to be followed by atrophy of the skin with extensive scarring, telangiectases and pigmentation. Cancer, too, may develop. To-day it may be legitimate to reduce a hypertrophic lupus by X-rays before resorting to more usual methods of treatment, but I should not care to use them for an ordinary case. Nevertheless, the method has a future when long rays of the Bucky type have been further developed. At present we can screen off soft rays, but not hard rays. Tubes are needed which will give only soft rays, and their penetration should not be further than to the subcutaneous tissue.

*Radium* has not been found better than other methods. If the beta rays could be used alone, they would probably act admirably as a slow caustic. Unfortunately, the gamma rays must also be present, and with them the danger to normal tissues, for it does not appear that the "selectiveness" (really vulnerability of the cells) is so marked as in malignant disease.

*General treatment by ultra-violet rays.*—I have deferred to the end on account of its importance the great value, when applied to the general surface of the body, of ultra-violet rays, whether derived from the sun, the open arc, or the mercury vapour lamp. When the body as a whole is exposed to these in the proper way the effect in improving the general health is striking. The mercury vapour lamp is placed three feet away from the patient twice a week, exposing the back and then the front for a period which is just short of producing a mild erythema, as indicated by slight

irritation some hours after, reported by the patient. The period varies with the patient and increases as the skin becomes acclimatized. So remarkable is the general tonic effect that it points to the probability that the skin is not merely a mechanical protection and a means of regulating body heat, but also possibly the seat of antibody formation. General health seems to be bound up with the health of the skin, and therefore any treatment of lupus vulgaris should be accompanied by the stimulation of the skin which ultra-violet rays alone can give.

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# Carcinoma of the Skin: Its Treatment by Radium

By ROY WARD, M.B.

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CARCINOMA of the skin is essentially an infiltration of the epidermis and tissue spaces by epithelial cells which have acquired the malignant neoplastic property. Histologically, three types may be recognized: (1) Squamous-celled carcinoma. (2) Basal-celled carcinoma or rodent ulcer. (3) Melanoma.

The squamous-celled growth is characterized by the presence of prickle cells, of cells containing granules of eleidin, and by the formation of cell-nests. The basal-celled growth or rodent ulcer is composed of solid masses of small cells, which are entirely devoid of prickles, and never become keratinized to form cell-nests. The cutaneous melanomas may be divided into two groups. Whereas the melanotic sarcoma arises from the connective tissue chromatophores and has the structure of a spindle-celled growth, the melanocarcinoma is said to take origin from the rete Malpighii of the epidermis, and consists of polygonal or spheroidal cells grouped in a solid alveolar arrangement like a carcinoma.

Although the microscopical appearance of a typical growth in any of these groups is extremely characteristic, great variation in structure often makes the histology an exceedingly difficult matter. In the more rapidly growing tumours there is often considerable variation in the size, shape and arrangement of the cells, and the section may be altogether a typical and even resemble a spindle-celled growth. Occasionally the features of both a rodent ulcer and squamous-celled carcinoma may be demonstrated in different parts

of the same growth. In a small and interesting group of cases the prickle-cell element appears to be the predominating feature, and some pathologists have called these growths "prickle-celled carcinomata." They present certain clinical characteristics and may be recognized as a clinical entity.

As elsewhere, an early diagnosis is essential if satisfactory results are to be obtained. Far more important, perhaps, is the recognition of some of the commoner precancerous conditions, many of which can be cured by a short surface application of radium. The exciting and predisposing conditions which may give rise to cancer of the skin are numerous, and include keratoses, xeroderma pigmentosa, pigmented warts and moles. The origin of epitheliomata has often been associated with old scalds or burns, animal and insect bites, chronic ulcers and sinuses, lupus vulgaris and lupus erythematosus. Although lupus-epithelioma is usually associated with prolonged X-ray treatment and radio-dermatitis, it has been pointed out by Sampson Handley that this condition existed long before the discovery of X-rays, and he quotes three cases which had never been subjected to radiation. In the same paper he points out that the non-ulcerative forms of lupus usually show papillary hypertrophy, caused by the blocking of the central lymphatic vessel of the papilla. He believes that lupus-carcinoma originates in these areas of hypertrophy.

There is no doubt that cutaneous cancer may follow prolonged or excessive irradiation of the skin, more particularly when the softer rays are employed. Before adequate protection was introduced, the hands of the earlier workers in X-rays and radium became subjected to repeated short doses of soft rays. This cumulative irradiation first produced a chronic radio-dermatitis, and later, epitheliomatous changes. Workers in gas-tar, pitch, and other products of the destructive distillation of coal, often suffer from pitch warts, and sometimes

these lesions become epitheliomatous. Bayet and Slosse suggest that the causative agent is the very small quantities of arsenic present in pitch and tar, but this view is not generally accepted. An important part played by radium in the prevention of skin cancer is in the treatment of pitch warts. Their prompt removal at a precancerous stage diminishes the number of cases of tar-epithelioma. Pitch warts can be cured by a single short application of radium, and this is important from an economic point of view, as the patient is able to return to work without loss of time.

*Squamous epithelioma* of the skin may be primary or



FIG. 1.—Squamous epithelioma, before and after treatment.

secondary. Clinically, it is seen in two main varieties, the ulcerative and the hypertrophic. The ulcerative variety is indurated and infiltrates the surrounding tissues. The edges of the growth are raised, hard and often everted. The hypertrophic or papillary lesions usually grow rapidly, but are mobile on the deeper structures except in the later stages. Both forms grow comparatively slowly compared with epitheliomata of other tissues, and metastases are late. Except in the very early stages these lesions have a characteristic odour.

*The prickle-celled epithelioma* is a rapidly growing



lesion of the papillary type. The history is therefore short, often only two or three weeks. On examination the growth is found to be covered with a thick layer of necrotic material. Although firmly adherent, it can be removed; when this is done numerous finger-like papillary processes can be seen extending into the growth. It bleeds easily, and as it tends to give rise to metastases more readily than other skin carcinomas it should be treated without delay. It is a very radio-sensitive growth.

*Transitional-celled epithelioma.*—Although there may be extensive local destruction a rodent ulcer never

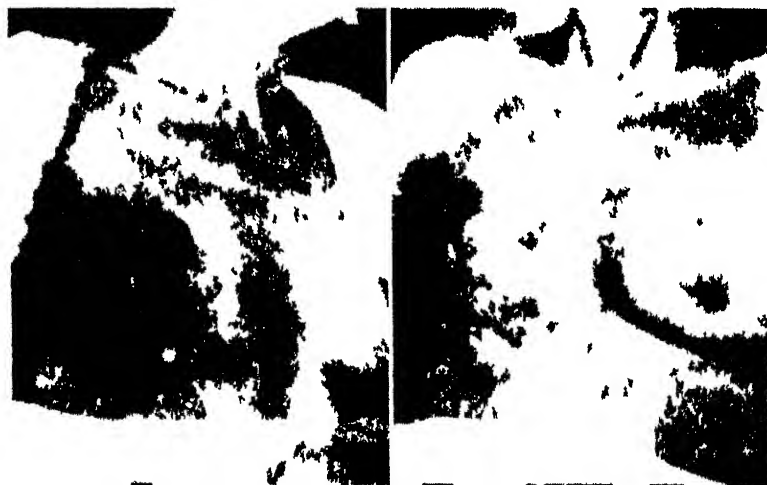


FIG 2—Carcinoma of the skin, secondary to carcinoma of breast, before and after treatment.

gives rise to metastases unless it assumes the clinical and histological appearances of a squamous-celled growth. When this occurs the disease progresses rapidly, and the change is sometimes associated with unsuccessful radiation and marked secondary infections.

*Secondary carcinoma* of the skin is most frequently seen in relation to recurrent carcinoma of the breast. The subcutaneous nodules of growth, the infiltrated skin and ulcerated areas often respond in a remarkable way to radium therapy. Although it is doubtful if

radium prolongs life in these cases, the palliative relief cannot be over-estimated.

*Rodent ulcer* usually begins as a smooth pearly nodule which grows very slowly, often assuming the form of a rosette of nodules with a raised margin and a depressed centre. This is the *early hypertrophic* variety. More nodules may appear and coalesce to form a growth of the *large hypertrophic* variety. On the other hand the growth may break down and form a superficial ulcer with a gelatinous base and a raised pearly margin. This is the *superficial cicatrizing* variety. The disease may extend deeply to reach the underlying tissues,



FIG. 3.—Rodent ulcer; superficial and deep ulceration, before and after treatment.

forming irregular cavities. Such lesions of the *deeply ulcerative* variety seldom have the typical rolled edge, and are usually associated with a marked degree of secondary infection.

Other rare forms may be seen. The *morphea* type occurs on the face, is usually ivory white in colour, and appears to be inset in the skin. The *psoriasis* type is often multiple and usually occurs on the trunk. With a magnifying lens the characteristic rolled edge at the margin of the large scaly patch can be seen. Occasion-

ally two different clinical varieties of rodent ulcer may appear in the same lesion. A hypertrophic growth may become superimposed on a rodent ulcer of the psoriasis type.

*Etiology.*—Squamous-celled growths may attack any part of the skin, but are commonly seen on the face and scalp, especially in the neighbourhood of the pinna; another common situation is the dorsum of the hand. Rodent ulcers are most frequent on the nose and cheek. Out of 1,773 consecutive cases treated at the Radium Institute more than 50 per cent. occurred in these situations. Both types of growth occur late in life, most frequently between the ages of 60 and 70.

*Diagnosis.*—The clinical diagnosis of skin epithelioma is comparatively easy. As there is a possibility that trauma may activate a growth, biopsy should be carried out in doubtful cases only. Tuberculous ulcerations and syphilitic lesions sometimes present difficulties, and these must be excluded by the history, a biopsy, and a Wassermann test.

*Radio-sensitivity and dosage.*—Without a microscopical section as a guide to the treatment, dosage must be estimated empirically on the past experience of successfully treated cases. At the Memorial Hospital (New York) an attempt is being made to put irradiation dosage on a more scientific basis. It is pointed out that it is essential to determine the degree of malignancy and the degree of radio-sensitivity of every variety of tumour on account of the wide variations which exist in clinically identical groups of cases. The radio-sensitivity is therefore first graded by the pathologist. On this information the minimum intensity in terms of the number of skin erythema doses required is determined, and the most beneficial way of giving this dose is calculated, whether this be by interstitial or surface irradiation.

Another method of standardizing dosage has been

devised by Murdoch (Brussels), who expresses the dose in terms of the energy absorbed by the tissue, using the erg centimetre milligramme hour unit.

By grading carcinomata into four groups, I, II, III, IV, Broders (Mayo Clinic) distinguishes between the highly differentiated adult type of growth, and the non-differentiated, very cellular, highly malignant variety. On this classification he explains the failure of many surgical operations in cases of high malignancy, and the unusual reactions to irradiation in growths of different grades. The non-differentiated types are extremely radio-sensitive. A more intensive dose of irradiation is usually required to bring about regression of a tumour of the highly differentiated group.

Inflammatory changes in a growth decrease its radio-sensitivity, increase that of the surrounding tissues, and thus cause the radio-sensitivity of the cancer cell to approximate closely to that of the normal tissue cell. Application of radium will only impair the vitality of the normal tissues and produce radio-necrosis. A marked degree of infection definitely contra-indicates any form of radium therapy. The normal tissue reaction, which is so important in successful treatment, is upset and the growth becomes more active. Further radiation will only increase the infective process.

*Treatment.*—There is no doubt that radium is the treatment of choice in most cases of skin epithelioma, except in melanotic carcinoma, which should always be excised widely and without delay. This should be done preferably with the diathermy cutting needle and the area subjected to a prophylactic irradiation. It is in the so-called "epidermoid" epitheliomata that the most striking and permanent results are obtained by radium therapy.

The treatment of cutaneous cancer has been established for years. More than a quarter of a century ago Wickham and Degrais, by their work on superficial conditions, indicated the possibilities of radium therapy.

Surgical removal is equally effective in some cases, but, from a cosmetic point of view, complete excision even of a small growth is difficult in those situations most commonly affected. Radium treatment is not only more conservative, but cosmetically gives results which cannot be obtained by any other method. Recurrences are frequent after X-rays, probably because the action of the rays cannot be limited with such great accuracy. The use of carbon dioxide snow, nitrate of silver, tincture of iodine and other caustic methods is usually unsatisfactory. The repeated application of any caustic agent to a precancerous lesion is definitely dangerous. It tends to irritate these conditions, which may take on rapid growth in consequence.

The use of radium by those with little experience cannot be too strongly condemned, especially in the treatment of skin conditions in which a thorough knowledge of the physical properties of radium and the principles of filtration is of paramount importance. When selecting the type of apparatus and filter, it must be borne in mind that every neoplastic cell must receive a minimum lethal dose. It is therefore desirable to distribute the dose as homogeneously as possible, and this can only be done by irradiating well beyond the depth and lateral limits of the tumour. The fundamental principle underlying all radium therapy is the estimation of the dose which will be sufficient to bring about the death of all the malignant cells without impairing the vitality of the surrounding normal tissue, so that healing will take place satisfactorily. The success of radium in the treatment of skin cancers depends not only on accessibility, but on the marked difference which exists between the susceptibility of the cancer cells and that of the normal skin. This probably accounts for the equally good results obtained at various radium centres, although the methods adopted are, in many cases, quite different.

*Filtration.*—The object of filtration is to cut off

various proportions of the beta rays, and sometimes the softer gamma rays in addition. The screen to be chosen depends on the amount of penetration required, and this in turn depends on the thickness of the metal and its density. Lead and platinum are most commonly employed.

*Secondary radiation.*—The passage of gamma rays through metal screens gives rise to the production of secondary rays which are of the soft beta type, and are capable of causing considerable surface irritation, or even ulceration, thus giving rise to a radium burn. For this reason it is generally necessary that they should be absorbed, and this is effected by the interposition of several sheets of black paper together with lint and thin rubber between the outer surface of the screen and the skin of the patient. In the case of tubes, these are covered with rubber, cork or vulcanite.

*Apparatus* —For contact surface irradiation, a suitable full strength plate is employed. These plates consist of solid plaques which vary in size and shape and contain 5 milligrammes of radium element per square centimetre. When it is necessary to irradiate only the more superficial layers of the skin, an unscreened applicator is used. By using a light screen, such as 0.1 millimetres of lead, the less penetrating rays which only act near the surface are absorbed, leaving a more penetrating but weaker radiation, which must be employed for a correspondingly longer time. For deeper penetration it is necessary to filter off all the beta rays and even some of the softer gamma rays. For this purpose a screen of 2 millimetres of lead is used.

When it is necessary to irradiate a larger or more penetrating growth a mould composed of Columbia wax, Stent, or sorbo rubber can be used, the radium being disposed in the form of needles, tubes or plates on the outer surface. This not only absorbs the secondary beta radiation but provides a more homogeneous dose by reason of the distance between the radium and the lesion. These radium plaques should always be composed of multiple foci heavily screened, and arranged in such a way as to produce a comparatively homogeneous irradiation on a plane at a distance equal to the thickness of the plaque. The screening should always be 2 millimetres of lead or its equivalent.

For interstitial irradiation two groups of needles are recommended. Those most commonly employed are of low content with walls of 0.6 millimetres of platinum, and containing 0.5 milligrams of radium element for each centimetre of active length. The linear intensity of the second group is much greater. They contain

2 milligrammes of radium per centimetre of active length and have walls of 0.3 millimetres of platinum.

Radon seeds have many advantages over radium element needles in the treatment of skin epitheliomata. They may be varied in size and filled to almost any intensity; moreover, a radon seed is active over the whole of its length, and its linear intensity cannot vary in different parts of the seed, whereas in a radium needle the eyelet and point are inactive, and the linear intensity may vary slightly owing to defective filling. Probably the most important advantage is that they can be employed in many situations where it would be impossible to apply needles.

Although the intensity of radon diminishes by 16 per cent. per day, the therapeutic activity is sufficiently long to produce the desired effect, as most cutaneous carcinomata are comparatively radio-sensitive. On account of the high cost of platinum, gold is usually employed when making radon seeds. There is practically no difference in the densities of these two metals. It has been found convenient to employ a seed with an activity of approximately 2 millimetres, and with walls either 0.3 millimetres or 0.5 millimetres thick.

*Technique.*—For small rodent ulcers, either of the hypertrophic or ulcerative varieties, an exposure to an unscreened full strength applicator is the method of choice provided the growth is superficial and mobile on the underlying structures. This method is also useful in the treatment of early growths of the squamous type. Before applying the plaque, which should be protected with thin rubber sheeting, all crusts must be removed. It is necessary to have a variety of applicators of different shapes and sizes, and an exposure of one and a half to two hours is given. In this way effective dosage can usually be given in one application of radium. A cure is almost invariably obtained. In the superficial cicatrizing variety it is necessary to irradiate a considerable distance beyond the visible margin of the growth, as outlying columns of cells are invariably present in these situations.

As a result of this intense beta irradiation an erythema is noticed in about ten days, reaching its height in about three weeks. Over this inflamed area a crust forms, which may dry and fall off, only to be replaced by another. The last crust usually falls off towards the end of the sixth week, leaving a soft and supple scar. During the reaction no active treatment is required. If

a local dressing is necessary, then unmedicated white vaseline or a very mild antiseptic ointment may be used. The destructive reaction is not marked and the patient is able to lead a normal life after treatment.

Larger ulcers, in which there is subjacent infiltration, must be treated by other methods. A light screen such as 0.1 millimetre of lead should be employed in these cases, and the apparatus applied for two to four hours according to the amount of infiltration present. For still larger ulcerated growths, and for those of the large hypertrophic type, gamma radiation must be used, either in the form of surface or interstitial irradiation.

The use of Columbia paste plaques for prolonged periods of two to three weeks has been advocated by some. The results are usually unsatisfactory and frequently disastrous, for, although in the course of these long applications the rays have more chance of finding the neoplastic cells at the moment of their greatest fragility, it is no less certain that the normal cells of the surrounding tissues are also affected adversely. The prolonged irradiation of the normal cells, and those already debilitated by the spread of the disease or by secondary infections may result, not only in a radium necrosis, but in increased activity of the neoplasm. It is therefore advisable, in order to avoid the disadvantages of prolonged exposures on the one hand, or of insufficient screenage on the other, to employ much larger amounts of radium screened through a minimum of 2 millimetres of lead or its equivalent for a comparatively short period. With this technique the duration of treatment varies between 48 and 72 hours. If the time is increased beyond a total of 72 hours, a damaging effect may be produced, especially in old people. Although, of course, it is desirable to destroy all the neoplastic cells to avoid recurrence, this should never be done at the expense of destroying the adjacent tissues, the integrity of



which is so necessary for satisfactory repair.

For large rodent ulcers, needles with the stronger linear intensity should be used. In the deep ulcerative lesions they are either inserted into or laid along the growing edge for a period of 48 to 72 hours. For the large hypertrophic rodent ulcer the same type of needle should be buried in or around the growth, and a similar exposure given. As a rough guide to the technique it may be stated that no part of the growth should be further than one centimetre from a source of irradiation, and it should be remembered that more massive doses should be placed at the periphery in order to obtain a homogeneous distribution. If needles are placed at the same distance from each other throughout the growth, the centre, being irradiated by its own foci as well as those adjacent, is necessarily exposed to a greater dose than the periphery.

For the larger squamous-celled growths, needles of weaker linear intensity should be used. Both in the ulcerative and warty type, the needles should be inserted in a parallel fashion, the points being introduced into the healthy tissue in the immediate vicinity of the growth. They are allowed to remain in position for a week.

By the end of six to eight weeks the resulting reaction subsides, and the growth gradually disappears, leaving a smooth scar. The primary growth should not be regarded as apparently cured, unless the treated area is perfectly soft. Any residual induration should be excised, as this may be the nucleus of a rapidly growing recurrence. This is done preferably with the diathermy needle.

Most squamous carcinomata run a slow course, and spread to the neighbouring lymphatic glands is usually late. In the large majority of cases the question of treating the glands does not arise. Prophylactic doses of radium are of doubtful value, but the patient should be kept under periodic observation. When glands are

present they should be dissected out if operable, and this should be followed by external irradiation. If inoperable, the surface application should be supplemented by interstitial irradiation. The permanent implantation of gold radon seeds has been found of great benefit in such cases.

The prognosis depends on the histological and clinical type and the extent of the disease. Growths in certain situations have a more serious prognosis. The duration of the disease and the presence of metastases is important. Previous X-ray and radium treatment and the presence of sepsis all tend to make a growth more radio-resistant. The physical condition of the patient has some bearing on the prognosis, radium treatment being always more successful in those patients whose general health has received attention. A very large percentage of all cases has been cured, and generally by one application of radium. The failures occur in those cases of advanced rodent ulcer in which the disease infiltrates the underlying bone or cartilage, and in squamous-celled growths with extensive metastatic involvement.

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# Abstracts of Recent Literature

## *Dermatitis Colonica: A Hitherto Undescribed Disease of the Skin*

A. Whitfield puts on record a hitherto undescribed and uncommon disease of the skin, for which he suggests the name "dermatitis colonica." He gives notes of several cases, in which the clinical appearances were correlated with the laboratory findings, occurring over a period of nearly twenty years. The chief points about the eruption are: (1) it is generally slightly or markedly irritable; (2) the borders of the patches show almost discrete flat red macules without noticeable alteration of the consistency of the skin; (3) most important is the well-defined telangiectasis visible with the simple lens. In all cases streptococci were in high excess in the faeces, in some cases to the practical exclusion of *B. coli*; but the author sees no justification for incriminating any particular organism, though the fact that one can foretell the flora of the faeces from the appearance of the eruption is sufficient evidence that the two are connected. Improvement in the condition is brought about by intestinal antiseptics, a slightly modified and digestible diet, and a greater amount of rest before and regularity of meals.—(*British Journal of Dermatology and Syphilis*, January, 1932, xlv, 24.)

## *Hyperglycaemia and Skin Diseases*

Georg A. Rost publishes an article on the relationship between certain disorders of carbohydrate metabolism and certain diseases of the skin. It is known to-day that the regulation of carbohydrate metabolism takes place partly through the islands of the pancreas, partly by the suprarenal glands, with the mediation of the sympathetic and parasympathetic nervous system. Not only the liver, but also the muscles, the fat-tissue and the skin serve as reservoirs for the blood-sugar or the glycogen produced by it, and the action of different ferments is indispensable. Recently it has been learned from the investigations of Zunz that there exists also a central control of sugar metabolism in the thalamic or retrothalamic region of the brain. Modern micro-chemical methods have facilitated blood-sugar tests, and a great number of authors have subsequently published the results of their investigations, but their opinions, regarding even the "normal value" (the quantity of sugar contained in 100 c.cm. of blood of a healthy person after twelve hours' fasting), vary very greatly. The method of investigation used by Prof. Rost is based on that worked out by Wislicki in His's clinic in Berlin. About one thousand cases have been tested by this method in rather over three years, and it has been found that there are two groups of skin diseases in which pathoglycaemic curves are often, though not always, found—namely, dermatitis intertriginosa and psoriasis. It is known that in diabetes an intertriginous dermatitis is not uncommon, and it is not surprising to find pathoglycaemic curves in

cases where a "pre-diabetic" state is present. In psoriasis the relation to disturbances of carbohydrate metabolism is not so obvious, and there is no reason as yet to believe in a closer connection between psoriasis and diabetes. With regard to eczema in general there is no hyperglycæmia, but no doubt a small group of cases exists where pathoglycæmic curves are to be found. Whether these cases are real eczema is a matter for discussion. No pathoglycæmic curves were found in cases of acne, seborrhœic eczema, furunculosis and other pyodermias, dermatitis toxica or venerata, carcinoma or tuberculosis of the skin—(*British Journal of Dermatology and Syphilis*, February, 1932, xliv, 57.)

### *Treatment of Lupus Erythematosus by Injections of Bismuth*

A. Sézary points out that though lupus erythematosus has been variously ascribed to the influence of tuberculosis, lympho-granulomatosis, streptococcal infection, and syphilis, its nature is not known with any certainty. In 1913, Ravaut, on the hypothesis that tuberculides occur in the subjects of congenital syphilis, employed "914" with good results, and in 1927 Sézary, impressed with the benefit obtained in non-syphilitic dermatoses the result of bismuth therapy, treated lupus erythematosus with success. Aqueous or oily solutions or suspensions are used and are well tolerated, and improvement follows rapidly after a few of a series of 12 to 15 injections given twice a week, and a cure follows in about 90 per cent., though a relapse occurs in 20 to 30 per cent. In these circumstances a second series of injections usually brings about a rapid cure.—(*Presse médicale*, Paris, 1932, January 27, 153.)

### *Generalized Scleroderma in Children*

E. L. Oliver records three cases and reviews the literature. Among Lewin and Heller's 508 collected cases of scleroderma there were ten only under the age of fifteen years. He concludes that the prognosis of generalized scleroderma is much better in children than in adults. While it is doubtful if there is any specific treatment for this condition, it may be worth while to try thyroid extract, as there are reports of cases improving while under thyroid treatment. The patients should be protected from cold, to which they are often hypersensitive. Massage has in most cases a favourable influence by helping the circulation and restoring some degree of mobility. Where combined with Raynaud's disease and there is much discomfort, sympathetic ganglionectomy should be considered as it has given brilliant results; in these cases removal to a warm climate may be very beneficial. (*Archives of Dermatology and Syphilis*, Chicago, 1932, January, xxv, 72.)

### *Eczema*

R. Saboursaud in an article on what is and what is not known about eczema summarizes the history and changes of opinion since Willan resuscitated the use of the word for dermatoses of rapid onset without fever but with inflammatory manifestations, over a part

or the whole of the cutaneous surface, and consisting of vesicles of very small size, which rupture and form crusts. He concludes that the word eczema is applicable only to red forms of dermatitis with a tendency to exudation and exfoliation, the cause of which is unknown. When the cause of a disease is discovered, this should be expressed and indicated in the name, for example, eczema caused by primroses is not eczema but a special form of dermatitis due to primroses. The word eczema should thus disappear with the advance of knowledge. On the other hand the word eczematization, which only describes a clinical and anatomical process of variable forms but fundamentally always the same, and consisting of exoserosis, should always be retained to indicate this form of cutaneous reaction.—(*Presse médicale*, Paris, 1932, February 10, 217.)

### *Basal Metabolism in Psoriasis*

M. Grzybowski has made a study of the basal metabolism in 44 cases of psoriasis and has come to the following conclusions: In 41 of 47 cases examined by Plantefol's method, the basal metabolism was found to be normal, with no manifest symptoms of any disturbed functioning of the thyroid. Of the 4 cases in which the basal metabolism was found to be irregular, one showed a lowered metabolism, probably due to excessive functioning of the ovaries and the thyroid gland; in 2 cases the metabolism was increased owing to undoubted hyperthyroidism; in the fourth case it was increased, probably owing to the patient's hyperpnea (80 litres in 5 minutes). It therefore seems reasonable to assert that there are no solid grounds for connecting the etiology of psoriasis with disturbances of the endocrine system and particularly of the thyroid.—(*Acta Dermato-venereologica*, Stockholm, November, 1931, xii, 381.)

### *Mycosis Fungoides*

D. Symmers states that the condition familiarly known as mycosis fungoides is one of the most confused and confusing to be encountered in the domain of medicine. In the author's opinion, the post-mortem and histological observations show that mycosis fungoides is the cutaneous expression of at least three different diseases of the lymph node system: Hodgkin's disease, a variety of round-celled sarcoma arising from the connective tissue reticulum of lymph nodes or elsewhere, and lymphosarcoma, originating in the lymphoid cells of the lymph nodes or of other lymphoid structures—in short, that mycosis fungoides as an independent form of disease does not exist.—(*Archives of Dermatology and Syphilology*, Chicago, January, 1932, xxv, 1.)

# Reviews of Books

*Diseases of the Skin.* By RICHARD L. SUTTON, M.D., F.R.S.E.  
8th edition. London: Henry Kimpton, 1931. 2 vols.  
Pp. 1,352. Coloured plates 11; illustrations 1,290. Price  
£2 12s. 6d.

WE welcome the 8th edition of Dr. Sutton's well-known textbook of dermatology. Of all the numerous works on the subject produced by the American school this is probably the best and its reputation is amply vindicated by the large number of editions called for within barely twenty years. The work itself has gradually grown from comparatively modest dimensions and it is already some years since it has been found necessary to divide it into two volumes. Meanwhile, the author has been indefatigable in following up and including in his pages all the recent developments of a very active branch of medicine, and the exertions which he has made for this purpose are indicated by the copious bibliography appended to every chapter. Although the author is generous in acknowledging the help he has received from his son and various other people one wonders how he has been able to produce a work of this magnitude while engaged in the active pursuit of his profession. The illustrations, which must always form a most important part of any textbook of dermatology, are numerous and well chosen, but we feel compelled to say that the coloured plates do not reach the standard set by the 1,290 untinted photographs. This, however, is not a very serious criticism of the work as a whole and we have no hesitation in commending it to all those who require an authoritative and complete treatise on dermatology.

*Handbook of Skin Diseases.* By FREDERICK GARDINER, M.D., F.R.C.S.E. 3rd edition. Edinburgh: E. and S. Livingstone, 1931. Pp. xi and 283. Plates 13; figs. 46. Price 10s. 6d.

IN this clearly written and suitably illustrated account of the commoner skin affections the lecturer on this subject in the University of Edinburgh takes the welcome and practical course of dealing with the matter from the point of view of a *raison de faire* rather than a *raison d'être*, though stress is rightly laid on the causation whenever this is necessary for efficient treatment. From long experience the author is able not only to set out the details that are just those wanted by the practitioner, but to give advice as to treatment. Some of these points may not be generally known; thus in the account of simple herpes labialis, due to a virus closely allied to that of epidemic encephalitis, he has found the use of streptococcal vaccine extremely beneficial; and in psoriasis, particularly of the flexures in hypothyroid individuals, thyroid may be most successful. With regard to the common employment of arsenic in this familiar disease it is pointed out that it is chiefly valuable in cases with chronic isolated patches and must be given with great discretion, intermittently, for three weeks with intervals of a fortnight.

*The Science of Signs and Symptoms in relation to Modern Diagnosis and Treatment.* By ROBERT JOHN STEWART McDOWALL, D.Sc., M.B., F.R.C.P.E. London: William Heinemann (Medical Books), Ltd., 1931. Pp. viii and 440. Price 21s.

PROFESSOR McDOWALL has chosen a very apt title for this book—"The Science of Signs and Symptoms," which is based on his earlier publication "Clinical Physiology." There can be little question as to the need for a work of this kind as it contains matter which cannot be adequately dealt with even in the larger text-books of medicine without unduly increasing their bulk, and also the results of modern research work which are not readily obtainable by the practitioner and student. For both classes of readers it should prove of great value as it contains much interesting matter expressed in a concise and lucid manner. Sections of the book which would call for special commendation are those dealing with the nervous system and respiration and that on exercise and rest. The bibliography is extensive, but we would suggest that in a future edition the references, especially to the journals, should be given fully with the page number. There can be little doubt that this book will meet with the warm reception it thoroughly merits.

*Clinical Atlas of Blood Diseases.* By A. PINEY, M.D., M.R.C.P. and STANLEY WYARD, M.D., M.R.C.P. Second edition. London: J. and A. Churchill, 1932. Pp. xvi and 105. Plates 38, 34 in colour. Price 12s. 6d.

It is not surprising that within less than two years a second edition of this extremely useful handbook should appear, which at a glance tells more than much poring over an explanatory printed statement as to changes in the blood pictures. The authors have added two more coloured plates, one of which shows the appearance of the blood in sickle-cell anæmia, the other in acute lymphatic leukaemia.

*Royal Berkshire Hospital Reports, Reading, 1932.* Edited by H. S. LE MARQUAND, M.D., M.R.C.P. Pp. 159. Figs. 21. Price 10s. 6d. Copies to be obtained from the Secretary of the Hospital.

THE staff of the Royal Berkshire Hospital must be congratulated on their energy in bringing out a well got-up volume containing seventeen articles which record with commentaries a number of interesting cases. Much of the material has been brought before the Reading Pathological Society, which dates back to 1841, and so is the oldest in this country. Its history was written up to 1909 by the late J. B. Hurry, President in that year, and these *Reports* will now take up the record of its proceedings for the future. Among the articles special reference should be made to that by Dr. Paul Cave on osteoplastic metastases in prostatic carcinoma, in which the bone becomes sclerosed instead of softened by the secondary growths. Mr. J. L. Joyce gives an interesting account of diverticulitis of the colon based on 35 cases, 25 of which were operated upon. Dr. Mills writes on glandular fever and the adrenal function, Mr. E. A. Dorrell reports three interesting ophthalmic cases, and the editor writes on pernicious anæmia in the aged, recording a case in a woman aged 79 years.







